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UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Survey

of

Perry County, Alabama

By

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Alabama Department of Agriculture and Industries

and

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United States Department of Agriculture]

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SOIL SURVEY OF PERRY COUNTY, ALABAMA

By J. F. STROUD, in Charge, M. E. STEPHENS, and M. E. SWANN, Alabama Department of Agriculture and Industries, and G. A. SWENSON, W. E. THARP, and B. H. WILLIAMS, United States Department of Agriculture

INTRODUCTION

Perry County, located in the west-central part of Alabama, is in the so-called "black-land" belt. Although termed a prairie county, it is one of the border-line counties including both prairies and hill land. The prairie part, comprising the southern end and southwestern portion, has a surface relief ranging from almost level to gently rolling. The hill land consists of broad, flat interstream areas, narrow winding ridges, steep hillsides, and broken gullied areas. About 40 percent of the land surface is so badly gullied and eroded as to preclude its use for general-farming purposes. Practically all the soils, except some of the bottom lands, have good surface drainage.

The climate is mild, equable, and healthful, and, in conjunction with the wide variety of soils, it favors a diversified agriculture. Hardy vegetables can be grown during the winter, and the grazing season for cattle ranges from 9 to 10 months a year.

Perhaps no other counties in Alabama have such wide differences in soils as do these border counties, nor is the influence of soil conditions more strongly impressed on the agriculture. A clear set of relationships exists between the soils and agriculture in the two distinct soil regions, namely, the prairies and the sandy uplands.

The prairies region includes both the true prairies, or lime soils, and the associated heavy clay soils, or semiprairies. The Houston, Sumter, and Bell soils, the true prairie soils, are highly calcareous and are derived from the underlying soft white limestone. The Oktibbeha, Vaiden, and Eutaw soils are part-prairie and part-timbered soils. These soils are highly acid and, apparently, are derived from beds of heavy clay several feet thick. Prior to the advent of the bollweevil in 1914, the prairie soils and associated clay lands were used extensively for the production of cotton. These soils, because of their heavy texture and structure, mature cotton late, and most of the crop is destroyed by the bollweevil. This condition has forced the farmers to wider use of these lands, and, as a result, the raising of livestock, the production of hay, particularly Johnson grass, and dairying have supplanted cotton growing to a large extent. The crops supporting the dairy industry seem to fit the soils and climatic conditions better than any other crop at present. The Houston and Bell soils are potentially productive soils, and, owing to the large quantity of organic matter contained in them and possibly to their better moisture conditions, are the best corn and grass soils in the prairies.

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In the sandy uplands and on the river terraces, a more diversified and self-sufficing type of agriculture is practiced. Although cotton is the principal crop here and is grown to greater or less extent by practically every farmer, it is supplemented by corn, oats, garden vegetables, sweetpotatoes, sorghum or ribbon cane, fruits, and leguminous crops. The dominance of cotton is a natural response to the character of the soils of this part of the county.

The dominant agricultural soils in the sandy uplands and on the river terraces, as mapped and described in the report, are the well-known fine sandy loams of the Orangeburg, Ruston, Luverne, Akron, Red Bay, Cahaba, and Kalmia series. Throughout the coastal plain of Alabama, these are considered among the best cotton soils in the State. They lend themselves admirably to the production of a wide variety of crops. Although they are naturally low in the soluble plant nutrients, they possess such favorable features that they respond readily to fertilization and produce some of the most profitable crops of the county. These soils are naturally well drained, warm up readily in the spring, and mature from one-third to two-thirds of a crop of cotton before the bollweevil arrives in the summer.

An abundant supply of good drinking water from wells, springs, and artesian wells is obtained in various parts of the county.

Perry County is favorably situated as regards railroad facilities. Some good roads have been built across the county, and Montgomery and Birmingham, which afford markets for dairy products, are readily accessible.

COUNTY SURVEYED

Perry County is situated in the west-central part of Alabama (fig. 1). Marion, the county seat, is about 100 miles southwest of Birmingham and about 85 miles west of Montgomery. It is about 45 miles west of the geographical center of the State. The county is of irregular shape and includes an area of 722 square miles, or 462,080 acres.

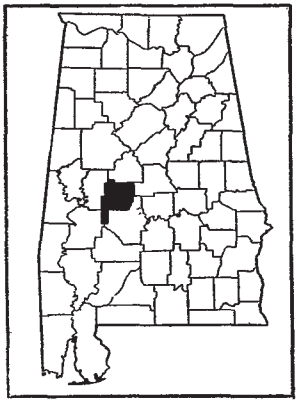

FIGURE 1.—Sketch map showing location of Perry County, Ala.

The county comprises two distinct physiographic divisions, one known as the prairie section and the other as the uplands or hill land. The prairies and sandy uplands gradually merge into each other for the most part, but in a few places a well-defined escarpment marks the division between them. The line separating these two divisions begins on the county line about one-half mile west of Cahaba River and follows closely up the river to the east of Hamburg, thence northwestward, passing about 3 miles south of Marion.

The surface features of the prairie section range from almost level to undulating and gently rolling areas, in which are many long smooth gentle slopes from the crests of the ridges to the natural drainageways. With the exception of the flatter areas, all this section has good

natural surface drainage.The streams have cut broad shallow valleys ranging from 10 to about 40 feet below the general level.

The surface relief of the sandy uplands, or hilly country, is characterized by broad rather flat ridges, narrow winding ridges, smooth hilltops, steep hillsides, and broken and gullied areas. Most of the rougher and more broken areas lie across the northern end and the northeastern corner of the county. Throughout the hilly section, drainage ranges from good to excessive. The streams have cut deep narrow V-shaped valleys, and in many places gulches, with a depth ranging from 50 to 100 feet, occur at the heads of the streams. The streams are rapidly cutting back into the ridges, resulting in serious erosion. Many streams have carved out valleys ranging from 50 to 150 feet below the general level of the country.

Bordering Cahaba River, which flows almost directly south through the central part of the county, and also along Oakmulgee Creek, are well-developed first bottoms and terraces. These range in width from 2 to 4 miles along Cahaba River, and from one-fourth to 1 mile along Oakmulgee Creek. The first bottoms are subject to overflow, but the greater parts of the second bottoms, or terraces, are well drained. Cahaba River, Oakmulgee Creek, Boguechitto Creek, and their tributaries constitute the drainage system.

Considerable difference in elevation exists between the prairie section and the highest parts of the so-called "hill section." The elevation [1] at Uniontown is 284 feet; at Marion, 263 feet; and at Marion Junction, just outside the southern boundary, 204 feet.

Throughout the sandy uplands the predominant trees are longleaf and shortleaf pines, oaks, and gums, and along the smaller streams gums, maple, and willow predominate. In the timbered parts of the prairie the principal trees are post oak, hickory, gums, haw, and yaupon, together with some shortleaf (rosemary) pine and old-field pine, but there is practically no tree growth on the true prairie land. Johnson grass, several kinds of clover, and numerous coarse weeds and grasses thrive on the prairie soils.

Good drinking water from deep wells and springs can be obtained, and flowing, or artesian, wells occur on the second bottoms along the river and in places on the prairies. Additional artesian wells could be bored at small cost.

Perry County was created by act of legislature on December 13, 1819, and was formed from territory, most of which belonged to no county though at one time was nominally a part of Montgomery County. It was named for Commodore Oliver Hazard Perry, hero of the War of 1812, and was embraced in the Creek cession of Fort Jackson, August 9, 1814. The Creeks and the Cherokees were the principal Indian tribes, and they, together with the Chickasaw and Choctaw Tribes, held land in this county until 1838, in which year, by treaty with the National Government, they ceded their land to the United States and removed to western reservations.

The 1930 census reports the population as 26,385, all classed as rural. It includes 7,207 native-born whites, 19,156 Negroes, and 22 foreign-born whites. Marion, the county seat, with a population of 2,141, and Uniontown, with 1,424, are the principal local markets

[1] GANNETT, H. A DICTIONARY OF ALTITUDES IN THE UNITED STATES. U.S. Geol. Survey Bull. 274, Ed. 4, 1,072 pp. 1906.

for cotton and other farm products. Hamburg and Scotts Station are railroad stations, and several flag stops are on the railroads.

Two branch lines of the Southern Railway traverse the county, one of which extends from Selma to Meridian, crossing the southern part; and the other, which connects this line with the Alabama Great Southern Railroad, extends across the central part from Marion Junction to Akron. The northern end and eastern half have no railroad. United States Highway No. 80, a paved road, crosses the southern end, passing through Uniontown, and the Birmingham-Mobile highway extends north and south crossing the Selma-Greensboro road at Marion. The last two roads have sand, clay, and gravel surfaces. A number of county roads are kept in fairly good condition during dry weather, being surfaced with sand, clay, and gravel, but, in places, many of them are impassable to automobiles during rainy weather, especially those in the heavy clay soils.

Churches for both white and colored people are well distributed. Judson College, for girls, and Marion Military Institute, for boys, are located at Marion. Consolidated schools for whites are located at convenient locations. By far the greater number of white farmers live in the Cahaba Valley and on the smoother land east and west of Marion. There are only a few telephone lines, but rural delivery of mail covers practically all sections.

There are no large manufacturing industries, but a cotton factory and a cheese factory are located at Uniontown. A high-tension power line crosses the county east and west through Uniontown. Next to agriculture, lumbering is the most important industry, and small sawmills are distributed over the timbered areas. Many crossties are cut, some staves are manufactured, and the turpentine industry is carried on to some extent in the northern part of the county.

CLIMATE

The climate is temperate. The summers are long and warm, but the heat is moderate, and cooling breezes are frequent. The spring and fall seasons are mild and pleasant, and the winters are generally pleasant, although a few cold days and periods of cloudy weather, attended by considerable rain, may occur. Snow or sleet storms occur occasionally but are of short duration. In general the climate is healthful.

The annual precipitation averages 48.92 inches, and it is generally well distributed, being especially favorable during the growing season. September, October, and November are the driest months. Conditions for the maturing and harvesting of the staple crops, particularly corn, cotton, peas, and sorghum, are good.

The average date of the last killing frost is March 14, and that of the first is November 16, giving an average frost-free season of 247 days. Frost has been recorded at Marion as late as April 7 and as early as October 25. Warm, pleasant weather for plowing and seeding prevails during the spring, and, in fact, farm work can be performed practically throughout the year, the only hindrance being rain. The highest temperature and lowest rainfall occur in the prairie section, and the lowest temperature and highest rainfall occur in the hill country of the sandy uplands.

The climate is favorable for diversified agriculture. Hardy garden vegetables, such as turnips, cabbage, and collards, can be grown during the winter, and lettuce, beets, onions, and radishes can be produced in early spring. Winter cover crops, including Austrian winter peas, vetch, oats, and rape, are successfully grown. The climate is favorable for growing native grasses, for a period of about 9 or 10 months, which is advantageous for dairying and livestock farming.

Table 1, compiled from the records of the Weather Bureau station at Marion, gives the more important climatic data, which are considered representative of the county as a whole. Marion is not the highest point in the county but is situated near the border line of the prairie and the uplands.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Marion, Perry County, Ala.*

[Elevation, 263 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1904)	Total amount for the wettest year (1919)
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*
December	46.7	75	10	4.62	6.91	10.74
January	46.5	75	12	5.36	.48	4.42
February	46.3	79	−1	5.38	9.19	8.53
Winter	46.5	79	−1	15.36	16.58	23.69
March	56.9	89	22	5.42	5.05	7.55
April	64.0	91	30	3.79	1.09	2.48
May	72.7	97	40	3.69	1.77	8.35
Spring	64.5	97	22	12.90	7.91	18.38
June	79.6	102	50	3.40	4.23	3.72
July	81.1	103	62	4.68	1.90	8.05
August	80.9	102	60	4.24	2.16	7.51
Summer	80.5	103	50	12.32	8.29	19.28
September	75.7	102	41	2.73	.54	.30
October	65.3	96	34	2.52	1.30	3.14
November	54.8	82	21	3.09	2.08	4.35
Fall	65.3	102	21	8.34	3.92	7.79
Year	64.2	103	−1	48.92	36.70	69.14

AGRICULTURAL HISTORY AND STATISTICS

The agricultural history of Perry County began with the coming of white settlers to this territory a little more than a century ago. With the exception of the prairie section, all the county was originally heavily forested with longleaf and rosemary pines, and oaks and other hardwoods flourished on the bottom lands. Much of this valuable timber was destroyed when the lands were cleared. The revenue from the sale of timber and lumber was considerable at one time, but, owing to devastation of the virgin forests, only a small revenue from this source is now obtained.

The early agricultural activities were mainly the production of subsistence crops, principally corn, wheat, and rice; the raising of hogs and cattle; and the growing of vegetables, together with small amounts of tobacco and indigo. Cotton was grown as early as 1772, and machines for separating the lint from the seed at the rate of about 70 pounds a day were in use. Almost from the time of first settlement, cotton has been the chief crop and has been grown on all the well-drained soils. Agricultural development has been gradual, but with the introduction of the cotton gin, cotton became the money crop, and its production increased until restricted by the ravages of the bollweevil.

The prairies were settled about 1817, but the planters avoided the black prairie land prior to 1830, because they had not learned to master the sticky soils. In 1827, the French colony at Demopolis, not far distant from Uniontown, reported to their European creditors that their vines and olives had failed. Johnson grass and pasture grasses, together with a small quantity of corn, have largely displaced cotton on the prairie soils and associated clay soils.

In 1879, according to the United States census, the principal crops were cotton grown on 74,303 acres and yielding 21,627 bales; and corn on 48,132 acres producing 628,248 bushels. At that time 6,093 acres of oats yielded 63,710 bushels, and small acreages of wheat, rice, sweetpotatoes, rye, hay, tobacco, and sugarcane were reported.

By 1889, both the acreage and yield of cotton had increased slightly, but the corn acreage had decreased. At this time some apples, peaches, sorghum, sweetpotatoes, and peanuts were grown. According to the census, 1899 was the banner year for the production of cotton, 90,049 acres producing 29,690 bales. The production of cowpeas, grasses, and other crops had also increased. In 1909, cotton was grown on about the same acreage, but the acreage in corn had decreased considerably. The value of other farm crops, together with vegetables, animals sold and slaughtered, and dairy products, had increased.

The arrival of the bollweevil, about 1914, had an important influence on the agriculture. The ravages of the weevil were very severe from the first, and the yield of cotton decreased from 29,459 bales in 1909, to 5,098 bales in 1919, although the decrease in acreage was only about 46 percent. This condition caused the farmers to diversify their crops to some extent, and as a result the production of hay, peanuts, and cowpeas and the sale of dairy products were greatly increased during this period. By 1924 production of cotton had considerably increased over that of 1919. This is probably owing to the fact that the farmers had learned more about growing cotton under bollweevil conditions.

The present-day agriculture, according to the census of 1930, consists principally in the production of cotton, corn, and hay. Cotton is the most important cash crop grown, and corn is the principal subsistence and feed crop. About 8,000 tons of Johnson-grass hay, considerable alfalfa and other cultivated grasses, and legumes for hay are produced each year. A few sweetpotatoes and peanuts, a small quantity of oats and wheat, a few beans, peas, potatoes, and sorgo and ribbon cane (for sirup) are grown mainly for home consumption. There are only a few peach, apple, and pear trees.

Table 2, compiled from the 1930 census, gives the acreage and yields of the principal crops in Perry County in 1929, and table 3 gives the value of all agricultural products by classes.

TABLE 2.—*Acreage and yield of the principal crops in Perry County, Ala., in 1929*

Crop	Acres	Yield	Crop	Acres	Yield
Corn:		*Bushels*			*Bales*
Harvested for grain	32,238	438,369	Cotton	64,810	19,431
		Tons			*Gallons*
Cut for silage	95	310	Sugarcane for sirup	333	41,414
Cut for fodder	106		Sorgo for sirup	328	19,706
Hogged or grazed off	64				
		Bushels	Forest products:		*Board feet*
Wheat	45	446	Saw logs		5,700,000
Oats:					
Threshed	485	9,437			*Cords*
Cut and fed unthreshed	1,615		Firewood		22,117
		Tons			*Number*
Hay	8,741	8,638	Fence posts		65,155
Timothy and/or clover	25	25	Railroad ties		7,700
Alfalfa	618	811			
Other tame grasses	6,723	6,192		*Trees*	*Bushels*
Wild grasses	732	864	Apples	2,769	1,340
Small grains	26	48	Peaches	3,743	17,442
Legumes	617	698	Pears	1,105	1,246
		Bushels			
Potatoes	73	5,604	Pecans	2,815	*Pounds* 20,720
Sweetpotatoes	1,351	103,733			
Vegetables for sale	270				
Peanuts	1,750	22,480			
Soybeans	351	943			
Cowpeas	1,661	9,152			
Velvetbeans	726	4,904			

TABLE 3.—*Value of all agricultural products in Perry County, Ala., in 1929*

Crop	Value	Livestock and products	Value
Cereals	$438,567	Domestic animals, chickens, bees	$1,333,478
Other grains and seeds	55,104	Butter, cream, and whole milk sold	300,457
Hay and forage	165,545	Butter churned	119,928
Vegetables, including potatoes	128,342	Wool	971
Fruits and nuts	15,423	Poultry raised	98,801
All other field crops	2,041,167	Chicken eggs produced	105,769
Farm garden vegetables	131,688	Honey produced	820
Forest products	123,163		
		Total	1,960,224
Total	3,098,999		
		Total agricultural products	5,059,223

According to the 1930 census, $179,045 were expended for commercial fertilizers in 1929. About 95 percent of the quantity used was applied to cotton. The county agent states that about two-thirds of the fertilizer is home mixed. The ready-mixed fertilizer usually contains about 4 percent nitrogen, 8 percent phosphoric acid, and 3 or 4 percent potash. The acre application of fertilizer to cotton ranges from about 100 to 400 pounds.

Farm laborers (mostly Negroes) are plentiful. The daily wage ranges from about 75 cents to $1 for general farm work and the monthly wage from about $20 to $40, depending on the kind of labor and the character of work performed. Cotton is picked by

hand at a rate ranging from 50 cents to $1 a hundred pounds of seed cotton.

The size of farms on the sandy soils ranges from about 40 to 360 acres, but in the prairie section the farms are much larger, ranging from about 360 to more than 2,000 acres. In the hilly uplands in the northern half of the county, several lumber companies, also a few individual farmers, have large holdings.

According to the 1930 census, of the 4,347 farms in Perry County, 463 are operated by white owners, 480 by colored owners, 441 by white tenants, 2,955 by colored tenants, and 8 by managers. Tenant farming has increased considerably since 1880. Of the 3,396 tenant farmers, 2,040 are cash tenants and 1,356 are share tenants. The rental for a 1-horse farm ranges from about $75 to $100, guaranteed by cotton.

On many farms, especially those occupied by the owners, the houses are substantial, and a few have modern conveniences, but many of the tenant houses are small and poorly kept. Most of the barns are small, except on the larger and better kept farms.

Tractors and other improved machines are in general use on the larger farms, particularly in the prairie section. The tools of the ordinary tenant farmer are simple and inexpensive. The work animals are principally mules, although a few draft horses are used. On the dairy farms in the prairie section, the grade-Jersey cow predominates, and Hereford is the most popular breed of beef cattle. Other breeds and nondescript cattle are kept. A few hogs are kept on most of the farms to supply meat for home needs.

At present very little land is changing hands. The prairie soils are considered the most valuable, the smoother sandy uplands and best drained river terraces rank next, and the hilly land, rough land, and cut-over land are of little value, except the areas supporting a good stand of timber.

The principal agricultural pursuits, in addition to cotton growing, are carried on only in the prairie section. They include cattle raising and dairying. Many beef cattle are raised and shipped out of the county annually. A number of herds of dairy cattle consist principally of grade Jerseys, but most of the herds are headed by a purebred bull to improve the herd. The greater part of the milk produced is shipped or hauled by truck to Selma, Montgomery, or Birmingham, and some is used locally by the cheese factory at Uniontown.

A large part of the hay is fed to beef cattle and dairy cows during the winter, and some corn and sorghum silage is fed to the dairy cows.

SOILS AND CROPS

Perry County, although termed a prairie county, contains about one-third prairie soils and associated heavy clay timbered soils, and two-thirds sandy uplands and river terraces. The prairie soils and heavy clay uplands occur almost exclusively in the southern end and southwestern part. The color, texture, structure, organic-matter content, acidity, and drainage conditions of the soils are markedly different in the sandy uplands and river terraces from those of the prairies and clay uplands. These differences are, in large measure,

due to the underlying materials from which the soils have been derived and also to the subsequent aeration, oxidation, erosion, and leaching which have taken place throughout many centuries.

The sandy upland soils have been derived from beds of unconsolidated sands and clays. Such original material usually gives rise to soils more or less sandy in texture, friable, crumbly, and dominantly low in lime and in the soluble plant nutrients.

The prairie soils—that is, the true prairie or lime soils—are derived from beds of soft white limestone, and these soils contain a high percentage of lime, especially in the subsoil. The soil material grades into the rotten limestone. Associated with these clay soils from limestone are areas of heavy clay soils, part prairie and part timbered. These soils appear to be the result of weathering of beds of heavy clays overlying limestone. Such soils are composed of heavy plastic clay in both the surface soil and subsoil, and they are decidedly acid.

The characteristics of the soils in the two sections of the county influence the agriculture or the kind of crops grown. As has been stated, the main crops are cotton, corn, and hay. Perhaps no other county in Alabama shows more marked differences in its soils, and in none does a clearer relationship exist between the characteristics of the soils and the agriculture practiced than in Perry County.

The fine sandy loams of the Orangeburg, Ruston, Red Bay, Luverne, Cahaba, and Kalmia series, because of their texture, friable consistence, and good drainage, warm up early in the spring and are very easily tilled. Although these soils are low in organic matter and the mineral plant nutrients, their physical properties are so good that they respond readily to the addition of commercial fertilizers and manures. More than 50,000 acres of these soils are devoted to the production of cotton. Both the soils and climate are favorable to this crop. Cotton on these soils matures early, and a fair crop is made before the bollweevil does much damage. The production of cotton meets the needs of a cash crop and is and has always been the only crop on which both the landowners and tenants can obtain credit and security for rent, supplies, and fertilizer. The farmers understand the growing of cotton and are adverse to the substitution of another crop; in fact, cotton is the only crop which finds a ready market for cash. It can be stored and kept for a long time, as it is nonperishable and deteriorates very slowly.

Corn is the second crop in importance, more than 32,000 acres being devoted to this crop in 1929. The yields throughout the county are dominantly low. The first-bottom and terrace soils, such as the Ochlockonee, Cahaba, and even the Kalmia, are the best soils of the sandy group for the production of corn. This is not because they contain more plant nutrients, except Ochlocknee silt loam, but because they have good moisture conditions, as a rule, during the greater part of the year. Ochlockonee silt loam contains considerable organic matter. In the prairie section, the Houston and Bell are the best soils for the production of corn. This is accounted for because the organic-matter content of these soils is high, and this, in a measure, influences the moisture conditions. Good corn soils are usually soils which are high in organic matter and which have favorable moisture-holding capacity. Corn, however, is grown

to greater or less extent over all parts of the county, and on all soil types. It is produced for feeding the work animals, fattening hogs, and is ground into meal for home consumption.

Throughout the sandy uplands and river terraces, in addition to the production of cotton and corn, garden vegetables, peanuts, cowpeas, soybeans, a very small acreage of wheat and oats, some watermelons, ribbon cane, and sorgo, together with a small amount of fruit are grown for home consumption. The agriculture on the sandy uplands is more diversified than can possibly be the case on the prairie soils and associated heavy clay soils, and, therefore, a more self-sustaining agriculture is practiced.

Prior to the advent of the bollweevil, the prairie soils were used almost exclusively for the production of cotton and were considered some of the best soils in the State for this crop. They returned good yields without the addition of fertilizer. The prairie soils and heavy clay soils are late in warming up in the spring, the bolls form later than on the sandy soils, and the weevils ruin most of the crop. Therefore, these soils cannot be used profitably for cotton under bollweevil conditions.

These soils are difficult to handle, that is, they have to be plowed and tilled under a narrow range of moisture conditions, as they are extremely plastic and sticky when wet and extremely hard when dry. They require strong work animals and heavy machinery for successful operation. These prairie soils have been held in rather large tracts and have been cultivated mainly by Negro tenants who have endeavored to grow cotton under bollweevil conditions. Many of them have failed to make enough to pay their rent in recent years, and, as a result, much of this land has been abandoned or is used for pasture. Therefore, the area of land in the prairies being put in grass and pastures has increased gradually since 1915, until, at the present time, the agriculture of this section consists mainly of raising livestock and dairying, together with the production of Johnson-grass hay. Some alfalfa is grown on the Houston and Sumter soils, and cotton and corn are produced on the Oktibbeha and associated Vaiden and Eutaw soils, but practically no cotton is grown on the Houston and Sumter soils. The hay crop, mainly Johnson grass, together with other grasses and clovers, covered more than 8,000 acres in 1929, and this acreage has probably increased in the last few years. Some of the hay is sold, but most of it is fed to cattle and to work animals.

Of the prairies soils, the Bell and Houston are the best grass and corn soils, because of the high content of organic matter and the prevailing moisture conditions. The Houston soil has become renowned for its production of alfalfa. Some of the best developed areas of the Sumter soils produce good alfalfa and sweetclover (*Melilotus*). Catalpa clay is used mainly for pasture and to less extent for the production of corn.

As cotton cannot be economically produced under bollweevil conditions, it seems that the most profitable system of agriculture and the most practical use of these prairie soils lies in the raising of livestock and dairying, as cattle can graze on the pastures the greater part of the year.

One of the unfavorable outstanding features today, in connection with the agriculture and soils of Perry County, is that at least 40 percent of the total area is so rough and broken in surface relief as to render it unsuitable for general-farming operations. Such areas are included in the Guin soils (undifferentiated), and the hilly phases of the Luverne, Orangeburg, Red Bay, and Ruston soils. Much of this land was once under cultivation but has been laid waste through destructive erosion.

The large number of different soils in Perry County can, according to their soil characteristics based on agricultural uses, be grouped into two general classes: (1) Sandy uplands and river terraces and (2) clay uplands and prairies.

In the following pages of this report the soils of the county are described in detail, and their agricultural relationships are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Perry County, Ala.*

Type of soil	Acres	Percent	Type of soil	Acres	Percent
Orangeburg fine sandy loam	8,832	1.9	Leaf fine sandy loam	3,456	0.7
Orangeburg fine sandy loam, hilly phase	33,344	7.2	Leaf clay loam	1,408	.3
Luverne fine sandy loam	1,856	.4	Myatt fine sandy loam	5,952	1.3
Luverne fine sandy loam, hilly phase	32,128	7.0	Myatt silt loam	3,968	.9
Red Bay fine sandy loam	3,520	.8	Ochlockonee fine sandy loam	2,112	.5
Red Bay fine sandy loam, hilly phase	10,752	2.3	Ochlockonee silt loam	13,696	3.0
Red Bay loam	1,344	.3	Meadow	28,416	6.1
Red Bay clay loam	2,688	.6	Houston clay	10,048	2.2
Akron loam	11,584	2.5	Houston clay, eroded phase	2,432	.5
Akron loam, rolling phase	2,240	.5	Sumter clay	14,976	3.2
Ruston fine sandy loam	10,304	2.2	Sumter clay, mixed phase	3,584	.8
Ruston fine sandy loam, hilly phase	17,088	3.7	Bell clay	17,472	3.8
Susquehanna fine sandy loam	1,344	.3	Oktibbeha clay	23,296	5.0
Susquehanna clay	2,240	.5	Oktibbeha fine sandy loam	6,080	1.3
Guin soils, undifferentiated	108,224	23.4	Vaiden clay	7,744	1.7
Cahaba fine sandy loam	13,440	2.9	Vaiden fine sandy loam, buckshot phase	1,536	.3
Cahaba silty clay loam	4,928	1.1	Eutaw clay	21,568	4.7
Kalmia fine sandy loam	10,624	2.3	Eutaw very fine sandy loam	2,304	.5
Kalmia fine sandy loam, poorly drained phase	2,496	.5	Catalpa clay	11,072	2.4
Kalmia fine sand	1,984	.4	Total	462,080	

SANDY UPLANDS AND RIVER TERRACES

The sandy uplands include all the Orangeburg, Ruston, Red Bay, Luverne, Akron, and Susquehanna soils and a classification of Guin soils (undifferentiated). These soils cover more than one-half of the county, or all except the river terraces and prairies. They have been derived from unconsolidated beds of clays, sandy clays, and sandy materials.

The fine sandy loams of the Orangeburg, Luverne, Red Bay, and Ruston series and Akron loam dominate the agriculture of this section. The soils of this group are light colored, that is, they range from light gray to light red in the surface layer and are badly leached of the soluble mineral plant nutrients. As their color indicates, they

contain but a small amount of organic matter, and they range from slightly acid to acid.

These soils range in surface relief from smooth broad divides and flat hilltops to narrow winding ridges and are favorable for tillage purposes. The natural surface drainage and internal drainage of all these soils are good. The soils warm up early in the spring and are the first in the county on which agricultural operations are begun. The sandy clay subsoils are sufficiently heavy in texture to retain moisture and fertilizer well and yet are sufficiently permeable that the movement of moisture in the surface soil and subsoil is good. These soils can be built up to a fair state of productivity.

Nearly all the areas of Orangeburg, Red Bay, Luverne, and Ruston fine sandy loams and Akron loam are under cultivation and produce most of the cotton, much of the corn, and the greater part of the garden vegetables and fruits.

Of the 314.9 square miles of soil included in the Guin soils, undifferentiated, and the hilly phases of the Orangeburg, Red Bay, Ruston, and Luverne soils, probably not more than 2 percent is under cultivation. These soils, having rough gullied surface relief, are the results in many places of destructive erosion, and the land is best suited to forestry. Most of the merchantable timber has been cut, and the present tree growth consists of longleaf and shortleaf pines, together with some sweetgum, black gum, hickory, oaks, and dogwood.

Developed along the creeks and Cahaba River are narrow strips of first-bottom soils, and wide continuous areas of second-bottom, or terrace, soils lie along the river. The materials forming these soils have been washed from the uplands in this and other counties, through which the streams flow, in the coastal plain, and brought down and deposited by the streams during times of overflow. On the second bottoms and terraces, this material has lain in a well-drained position for sufficient time to have produced soils somewhat similar in their characteristics to some of the upland soils, especially Cahaba fine sandy loam which corresponds in color and structure to Ruston fine sandy loam.

The Cahaba and Kalmia soils are well-drained soils on these terraces, or second bottoms, and are used largely for the production of cotton and corn. The Leaf soils are used to some extent, but the Myatt soils are poorly drained and are, for the most part, forested. The Ochlockonee soils predominate on the first bottoms of the sandy uplands and extend along Cahaba River. These first-bottom soils are used mainly for the production of corn and for pasture. The rest of the areas are forested to loblolly and shortleaf pines, sweetgum, water oak, poplar, maple, and bay.

Orangeburg fine sandy loam.—Orangeburg fine sandy loam is developed in the northern half of the county and may be considered the representative soil of the smooth upland in that section. This soil has many characteristics common to several of the soils with which it is associated. In cultivated fields the surface soil to plow depth is light grayish-brown or light yellowish-brown material underlain by brownish-yellow loamy fine sand which extends to a depth of 12 or 15 inches. A reddish-yellow layer of fine sandy loam is present and represents an intergrade of material between the light

sandy surface soil and the red subsoil. The subsoil is friable and crumbly red fine sandy clay of uniform color throughout, which extends to a depth ranging from 40 to 60 inches, where it grades into light-red fine sandy clay material, faintly mottled or streaked in some places with yellow and shades of yellow and light red. The material in this layer is somewhat compact and very brittle.

The difference in surface relief and the amount of erosion which has taken place have changed the surface soil in many places and have produced two important variations. Where erosion has been active, much of the sandy surface layer has been removed, and a 4- to 6-inch layer of reddish-brown fine sandy loam occurs in small patches. The other noticeable difference in the surface soil occurs mainly at the bases of slopes, where a slight accumulation of fine or medium sand has resulted in a deep sandy surface layer. Owing to these conditions, some of the fields on the more sloping areas present a spotted appearance. This soil is developed in the central-western part of the county, the largest areas occurring northwest of Marion.

Orangeburg fine sandy loam is mellow and friable, is naturally well drained, warms up quickly in the spring, and is very easy to cultivate, both with improved machinery and hand tools. The red fine sandy clay subsoil has physical properties that enable it to absorb considerable rain water and retain it for the growing crops. Although this soil is naturally low in soluble plant nutrients, its good qualities cause it to respond readily to fertilizers and manure. The effect of turning under green-manure crops is noticeable for several years. The soil is adapted to growing a wide variety of crops common to this climatic section.

Owing to its favorable surface features and to its mellow character, practically all the land is under cultivation. Cotton occupies probably 80 percent of it, and the acre yields range from one-fifth to 1 bale, depending on the amount of fertilizer applied and the season. Usually from 200 to 400 pounds of a 3–8–3 [2] or 4–8–4 mixture are used, and some farmers apply from 75 to 100 pounds of nitrate of soda to cotton when it is chopped. Much of the rest of the cultivated land is devoted to corn, and the yields depend largely on the organic matter in the soil, favorable seasons, and the quantity of fertilizer used. Some farmers apply from 100 to 150 pounds of nitrate of soda when the corn is about 2 feet high. If corn follows a leguminous crop which has been turned under, no nitrate of soda is used. Peanuts, sweetpotatoes, cowpeas, soybeans, velvetbeans, watermelons, garden vegetables, peaches, pecans, and grapes, although grown in small quantities, do well. Production of any of these special crops on a commercial scale could easily be obtained if a market for such products were available.

Orangeburg fine sandy loam, hilly phase.—Orangeburg fine sandy loam, hilly phase, occurs in close association with Orangeburg fine sandy loam north and northwest of Marion and east of Sardis Church. The surface soil is much more variable in thickness than the surface soil of the typical soil, because it has been subject to more erosion and washing. This soil differs essentially from typ-

[2] Percentages, respectively, of nitrogen, phosphoric acid, and potash.

ical Orangeburg fine sandy loam in that it occupies rolling or hilly areas and, in some places, steep slopes. Owing to the rough surface relief, only a small part of the smoother land can be safely farmed. If the steeper slopes were put under cultivation, washing and erosion would soon destroy the surface soil, as has happened in many of the formerly cultivated areas. The soil occurs mainly in areas of cut-over land which are now reseeding naturally to pines where protection is given from destructive fires and from hogs. Under present economic conditions this land is best suited to forestry.

Luverne fine sandy loam.—Luverne fine sandy loam is developed in the northwestern part of the county in close association with Orangeburg fine sandy loam, and the surface relief and drainage conditions are about the same as with the Orangeburg soils. One of the main differences between the Luverne and Orangeburg soils is in the character of the material composing the subsoil. The upper subsoil layer of Luverne fine sandy loam is dull-red or dark-red stiff tough compact clay breaking into hard angular aggregates when dry and being slightly plastic when wet. It cracks and checks when exposed in a road cut, whereas the Orangeburg subsoil material crumbles and flakes off. This heavy layer in the Luverne soil usually begins at a depth ranging from 10 to 15 inches below the surface and extends to a depth ranging from 24 to 30 inches. Below this is reddish-yellow rather heavy but friable fine sandy clay which, in most places, carries a noticeable quantity of small mica scales and some yellow mottlings. This layer grades, at a depth ranging from 3 to 5 feet, into the parent material consisting of beds of laminated light-gray clay and thin seams or bands of yellow very fine sandy clay which is heavier than that giving rise to the Orangeburg soils.

The cultivated surface soil of Luverne fine sandy loam is light-gray or yellowish-gray loamy fine sand to plow depth, where the material passes into pale-yellow or brownish-yellow loamy fine sand which in places rests on the heavy subsoil but in other places passes into a 1- or 2-inch intergrade layer of reddish-brown heavy loamy fine sand. A few gall spots occur in the eroded areas where the soil, to a depth of 6 or 8 inches, is reddish-brown fine sandy loam.

Luverne fine sandy loam has very favorable surface relief ranging from almost level to gently rolling. All the land is naturally well drained, and the greater part is cleared and farmed. This is a desirable soil, and some farmers consider it a slightly stronger soil than Orangeburg fine sandy loam. It has the power to retain larger quantities of moisture and hold plant nutrients better than the associated soils, and crops suffer less from drought than on the other sandy upland soils. The crops grown and the methods of cultivation and fertilization are about the same as on Orangeburg fine sandy loam, and the yields in some places are slightly higher.

Luverne fine sandy loam, hilly phase.—Luverne fine sandy loam, hilly phase, is separated from typical Luverne fine sandy loam because of its rough surface relief. It occupies hilly areas, narrow winding ridges, fairly steep slopes, and broken areas, in which many deep gullies occur at the stream heads. Erosion has been and still is very active. As a rule, the surface soil is much shallower

and more variable in color and texture than typical Luverne fine sandy loam, and, although the subsoil is well developed in most places, the parent material lies near the surface and is even exposed in small spots here and there.

This hilly soil is developed in extensive areas in the northwestern part of the county around Blackburn and on both sides of Brush Creek and Little Brush Creek.

None of the land is under cultivation, with the exception of a few small patches, as most of it is too rough. This soil formerly supported a good growth of shortleaf pine, but practically all the merchantable timber has been removed, and second-growth pine now covers the land. Where protected from fire, the pine reseeds naturally. The best present use of land of this kind is forestry.

Red Bay fine sandy loam.—Red Bay fine sandy loam differs from Orangeburg fine sandy loam in the color of both the surface soil and subsoil and in that the Red Bay soil has a slightly heavier subsoil than the Orangeburg soil. The 6- to 12-inch surface soil ranges from brown to reddish-brown fine sandy loam. The subsoil is deep-red fine sandy clay extending to a depth ranging from 35 to 40 inches, and it is heavier in the upper part than the Orangeburg subsoil. This layer grades into light-red or yellowish-red friable fine sandy clay or fine sandy loam. It may become slightly compact in exposed cuts.

Red Bay fine sandy loam is an inextensive soil. It occurs in small bodies, some of the largest being in the vicinity of Fellowship Church and east of Union Chapel. A fairly large area is northeast of Waters Store, and a body lies east of Felix. The surface relief is smooth or undulating, as the soil occupies high plateau-like areas, and all of it lies favorably for farming operations. It is naturally well drained.

This is an important agricultural soil, and practically all of it is under cultivation, about 90 percent being used in the production of cotton, to which it is well suited. About the same quantities and the same grades of fertilizers are used on this soil as on Orangeburg fine sandy loam. Cotton yields from one-fourth to three-fourths bale an acre, depending on seasonal conditions, cultural methods, and the quantity of fertilizer applied. About 80 percent of the remainder is used for corn which yields from 15 to 40 bushels an acre under present cultural methods, with an average of about 20 bushels. The higher yields are obtained in seasons of favorable moisture conditions and where a top dressing of about 100 pounds of nitrate of soda is applied. Yields of oats average about 40 bushels an acre when given an application ranging from 100 to 150 pounds of nitrate of soda in early spring. Peaches, pecans, peas, peanuts, soybeans, velvetbeans, potatoes, and many garden vegetables return good yields.

Red Bay fine sandy loam, hilly phase.—Red Bay fine sandy loam, hilly phase, differs from the typical soil mainly in surface relief and in the more variable texture and thickness of the surface soil. This hilly soil occurs in large bodies along the eastern side of the county. It occupies rolling hilly areas, some of which are deeply gullied. It is subject to severe erosion, and in places the surface covering of fine sandy loam has largely been removed, although

at the bases of slopes and in slight swales an accumulation of 15 or 20 inches of brown loamy fine sand may occur. The subsoil is essentially the same as that of the typical soil.

This soil is subject to severe erosion where not protected by properly constructed terraces, forest, cover crops, or grasses. Only the smoother parts of the land, which comprise about 10 percent of its total area, are under cultivation. The cultivated land is used for the same crops and is handled in the same way as typical Red Bay fine sandy loam, but the yields are generally lower. Forestry is the best use for this soil.

Red Bay loam.—Red Bay loam occurs in small areas in the southeastern part of the county, west, east, and northeast of Perryville. This soil differs from Red Bay fine sandy loam in texture of the surface material. It represents areas from which much of the fine sandy material has been removed by surface erosion.

This is an inextensive soil. It is productive, and practically all of it is used for cotton. The yields are about the same as on Red Bay fine sandy loam.

Red Bay clay loam.—Red Bay clay loam represents areas that were once Red Bay fine sandy loam, but through sheet erosion most of the fine sandy loam surface soil has been removed. The surface soil is red or reddish-brown clay loam, although the topmost 2 or 3 inches, in many places, consists of reddish-brown fine sandy loam. The subsoil is similar to that of the fine sandy loam. The surface relief is rolling or sloping, and drainage is everywhere good.

This soil is not so easily tilled as Red Bay fine sandy loam, and cotton does not mature so early on it. About 5 percent of the land is under cultivation, and the rest is covered with pine timber and scattered hardwoods. The soil is subject to serious gullying unless protected by forest or grass cover. The best use for Red Bay clay loam, as a whole, is forestry.

Akron loam.—The surface soil of Akron loam consists of a 4- to 8-inch layer of mellow and friable brown or reddish-brown fine sandy loam. The subsoil is dark-red or maroon clay which is compact, tough, and heavy, slightly plastic when moist, and of uniform color and consistence to a depth ranging from 3 to more than 4 feet. Below this is moderately friable and crumbly light-red clay which becomes mottled and streaked with yellow at a depth ranging from 48 to 72 inches. Although this layer is much heavier than the underlying layer of the Red Bay soils, it is less tough and compact than the upper subsoil layer. In appearance this soil is very similar to the Red Bay soils, but it differs from those soils in that the subsoil is everywhere compact, tough, and breaks into hard lumps or small angular granules, as contrasted with the more friable subsoils of the Red Bay and Orangeburg soils.

Akron loam is developed in rather large areas in the vicinity of Marion, east and southeast of Zimmerman, and northeast and north of Coleman. The surface relief ranges from almost smooth and level to undulating and gently sloping. All the land is well drained, and erosion is less pronounced than on most soils of the county.

All this soil is cleared and farmed. It is one of the strongest and one of the best cotton soils in the county, and practically all

the land is devoted to this crop. Cotton yields range from about one-third to 1 bale an acre, depending on the quantity of fertilizer used, the season, and the extent of ravages by the bollweevil. Corn and other crops do well, especially cowpeas, Austrian winter peas, and other leguminous crops. The same cultural methods and practically the same quantity of fertilizer are applied on Akron loam as on Orangeburg fine sandy loam or Red Bay loam. Oats and small grains, although grown on only a small acreage, give good results.

In table 5 are shown the results of mechanical analyses of samples of the surface soil, subsurface soil, and subsoil of Akron loam.

TABLE 5.—*Mechanical analyses of Akron loam*

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
417001	Surface soil, 0 to 5 inches	0.1	0.9	8.9	31.4	9.3	34.0	15.3
417002	Subsurface soil, 5 to 48 inches	.1	.5	4.6	16.9	5.0	14.0	59.0
417003	Subsoil, 48 to 72 inches	.2	1.1	8.1	15.1	4.1	14.2	57.2

Akron loam, rolling phase.—Akron loam, rolling phase, is similar to typical Akron loam as regards the color of both surface soil and subsoil. In many places the loam surface soil is only a few inches thick or has been entirely removed by erosion, and the subsoil layer is not so thick throughout the greater part of the rolling phase as in the typical soil. Another difference between this soil and typical Akron loam is the surface relief, the phase occupying sloping, rolling, and even hilly areas. Because of its surface relief, the land is subject to severe erosion, and in spots the surface loam has been entirely removed, thereby exposing the red clay, and some gullies have formed.

Probably not more than 5 percent of this rolling land is under cultivation. The crops grown and methods of cultivation are the same as those practiced on typical Akron loam, but in some places crop yields are slightly less. Some of this soil could probably be used advantageously for pasture, but the greater part of it should be devoted to forestry.

Ruston fine sandy loam.—Ruston fine sandy loam differs from Orangeburg fine sandy loam in color of both surface soil and subsoil. The surface soil, to a depth of 4 or 5 inches, is gray or brownish-gray loamy fine sand underlain by pale-yellow or brownish-yellow loamy fine sand which extends to a depth ranging from 12 to 16 inches. The subsoil is yellowish-red or yellowish-brown fine sandy clay extending to a depth ranging from 40 to 50 inches. The material in this layer is friable and crumbly and readily crushes to a friable mass. It grades into reddish-yellow, mottled with yellow and light gray, fine sandy clay. At the bases of slopes and on some of the flatter areas the surface soil may range from 20 to 24 inches in thickness, and it may be light gray or brownish gray. Most of the areas having a browner surface soil are developed in the flatter positions.

Ruston fine sandy loam has a surface relief ranging from nearly level to gently rolling and sloping, and all the land lies favorably for farming operations.

This soil occupies fairly large areas in the western part of the county northwest of Coleman, in the southeastern part in the vicinity of Pine Flat Church, and in the extreme northeastern corner.

Probably 80 percent of Ruston fine sandy loam is under cultivation, of which about 70 percent is used for the production of cotton, and the remainder is devoted to corn, cowpeas, peanuts, beans, soybeans, and forage crops. This soil is cultivated and fertilized in about the same way as Orangeburg fine sandy loam, and the yields obtained are practically the same or slightly lower.

Ruston fine sandy loam, hilly phase.—Ruston fine sandy loam, hilly phase, differs from the typical soil in that it occupies rolling or hilly areas having some rather steep slopes. The surface soil and subsoil are not so uniform in color and texture as in Ruston fine sandy loam. Gullying and erosion have changed the surface soil or entirely removed it in some places.

From 5 to 10 percent of the land is under cultivation. The cultivated land comprises the narrow winding ridge crests and the smoother slopes here and there. This hilly soil occurs in both rather large and small areas scattered over the northern half of the county. Most of the land is in timber, the tree growth consisting mainly of loblolly and other pines. Forestry is the best use for this soil.

Susquehanna fine sandy loam.—The 4- to 6-inch surface layer of Susquehanna fine sandy loam consists of mellow and friable gray fine sandy loam. It is underlain by pale-yellow fine sandy loam which extends to an average depth of about 10 inches. The subsoil begins as dull-red or reddish-brown heavy sticky and plastic clay, mottled with yellow and some gray, which changes, at a depth ranging from about 18 to 24 inches, into mottled yellowish-red and gray clay, the gray color becoming more pronounced at a depth of about 30 inches.

This soil is inextensive and occurs only in small areas in the northwestern part of the county. It occupies ridge crests and gently sloping areas.

Probably not more than 40 percent of the land is under cultivation. Practically the same crops are grown, similar cultural methods are practiced, and about the same quantity of fertilizer is applied as on Orangeburg fine sandy loam, but yields are generally lower than on that soil. This soil produces good timber.

Susquehanna clay.—Susquehanna clay differs from Susquehanna fine sandy loam in that practically all the fine sandy loam surface soil has been removed by erosion. It is included in this group of soils because of its association with the fine sandy loam. In many places the heavy reddish-brown clay is exposed on the surface, but some of the smoother areas have a 2- or 3-inch covering of grayish-yellow fine sand over the heavy clay. The subsoil is similar to that under Susquehanna fine sandy loam. This soil occurs in a small area northeast of Marion, and in the southwestern corner of the county.

Probably not more than 2 percent of the land is now under cultivation. It is difficult to till because the heavy clay, which is sticky

and plastic when wet, dries out very hard and cracks when dry. Cotton matures late on this soil. Some areas of Susquehanna clay, once under cultivation, are now abandoned or used for pasture land. The greater part of this soil supports a second growth of shortleaf pine, which grows rapidly, and its best use is for forestry.

Guin soils, undifferentiated.—The Guin soils, undifferentiated, include patches of Orangeburg fine sandy loam, Ruston fine sandy loam, Susquehanna fine sandy loam, Susquehanna clay, and Luverne fine sandy loam, so intricately mixed and so rough in surface relief that no soil type separation could be made on a small-scale map. The surface features of these undifferentiated soils consist of a series of rough broken hills, narrow winding ridges, knobs, and steep hills—in other words, deeply dissected areas where deep gullies and narrow V-shaped valleys prevail. Erosion is responsible for the broken relief and the extremely mixed or varied character of the surface soils.

This classification of material covers the largest total area in the county. Large continuous areas occur across the northern end, particularly the central-northern part, and similar areas are developed in the eastern and central parts.

Guin soils, undifferentiated, represent a large part of the rough or broken land of the county. Much of this territory was once productive soil of the types mentioned, but these once good lands have been laid waste by erosion. Probably not more than 1 percent of the land is now farmed. Small spots of typical soils occur throughout the area but not in sufficiently large bodies to be farmed economically. Considered as a whole, this classification of material is nonagricultural. Owing to its rough relief and the generally sandy character of the surface material, the land is better suited to forestry than to pasture. The greater part of it is now forested with second-growth longleaf and shortleaf (rosemary) pine, together with a few oaks, hickory, and other hardwoods.

Cahaba fine sandy loam.—Cahaba fine sandy loam is one of the best and most important general-purpose soils on the second bottoms and terraces of Perry County. It is the best aerated and most thoroughly oxidized soil on the terraces and has the reddest color throughout. The surface soil is brown loamy fine sand to a depth ranging from 10 to 15 inches, the upper part containing slightly more organic matter and being of slightly darker color. It is everywhere mellow and friable and easy to till. The subsoil is reddish-yellow or yellowish-brown friable crumbly fine sandy clay extending to a depth ranging from 35 to 40 inches. Below this is yellow or reddish-yellow, mottled with gray and brown, fine sandy clay material, or in some places, light fine sandy loam.

Cahaba fine sandy loam occurs in rather large areas on terraces along Cahaba River in the vicinities of Sprott in the central part and Felix in the southern part of the county. Its surface relief is almost level or gently undulating, and drainage is everywhere good.

About 90 percent of this soil is under cultivation, and the crops grown are cotton, corn, cowpeas, velvetbeans, sweetpotatoes, oats, and sorgo. Of the cultivated land, about 80 percent is devoted to cotton, the yields ranging from about one-fourth to three-fourths bale an acre. Corn yields fairly well, especially following cowpeas or vel-

vetbeans, which have been turned under. Sorgo does well, but the sirup is not so bright as that produced on Kalmia fine sandy loam. Cultural methods and the quantities of commercial fertilizer applied are practically the same as on Orangeburg fine sandy loam. The yields of most crops average slightly higher than on Orangeburg fine sandy loam, probably owing to slightly better moisture conditions and to a slightly larger amount of fine material in the surface soil.

Cahaba silty clay loam.—Cahaba silty clay loam differs from Cahaba fine sandy loam in thickness of the surface soil and in the slightly heavier texture and finer material of both surface soil and subsoil. The surface soil consists of a 4-inch layer of friable mellow brown silty loam or silty clay loam. The subsoil is reddish-brown silty clay or clay of uniform color and texture to a depth ranging from 30 to 40 inches, where it is underlain by brownish-yellow loamy fine sand. The subsoil is stiff and brittle but can be crushed easily to a friable mass.

Cahaba silty clay loam is a younger soil than Cahaba fine sandy loam. It lies at lower elevations and is not so well drained. It is subject to overflow during flood stages of the streams.

About 60 percent of the land is under cultivation, and of this about 70 percent is used for corn. It is the strongest and most fertile, and could be made the most productive, terrace soil in the county. Acre yields of corn range from about 20 bushels to 40 bushels, without fertilizer. Soybeans and cowpeas, which are usually interplanted with the corn, produce good yields. Practically all the rest of the cultivated land is used for the production of cotton. Owing to its low position and the rather heavy character of the soil material, yields of cotton are rather uncertain, the crop being subject to destruction by the bollweevil. In favorable seasons the acre yields of this crop range from one-half to three-fourths bale or more. The soil is well suited to the production of sugarcane and sorgo. It is an excellent grass soil, and more of it could be used profitably for pasture, particularly if it were seeded to lespedeza and carpet grass.

Kalmia fine sandy loam.—Kalmia fine sandy loam occurs closely associated with Cahaba fine sandy loam but differs from that soil in the color of both the surface soil and subsoil, and it is not quite so well drained. The surface soil of Kalmia fine sandy loam is light-gray or yellowish-gray loamy fine sand to a depth of 4 or 6 inches, underlain by pale-yellow loamy fine sand which extends to a depth ranging from 12 to 15 inches. The subsoil is yellow or pale-yellow friable and crumbly fine sandy clay extending to a depth ranging from 30 to 36 inches, where it becomes mottled with gray and rust brown.

This soil occupies slightly lower positions than the Cahaba soils and is not so well drained, aerated, or oxidized. Its surface relief is comparatively flat, and rainfall does not run off quite so readily as from Cahaba fine sandy loam.

Kalmia fine sandy loam occurs in large areas in the vicinities of Sprott and Felix and in other places on the terraces and second bottoms along Cahaba River and Oakmulgee Creek.

This soil is easy to till and responds to commercial fertilizers and to the addition of any form of organic matter, as it is naturally low

in organic matter. Approximately 90 percent of the land is under cultivation, and of this, about 80 percent is used for cotton, 15 percent for corn, and the rest for sorgo, cowpeas, velvetbeans, and minor crops. Yields of cotton average somewhat lower under similar fertilizer applications than those obtained on Cahaba fine sandy loam. Although yields of corn and sorgo are comparatively low, the quality of sorgo sirup is excellent. Sweetpotatoes do particularly well. Some of the land is used for pasture, especially where seeded to carpet grass and lespedeza.

Kalmia fine sandy loam, poorly drained phase.—Kalmia fine sandy loam, poorly drained phase, differs from typical Kalmia fine sandy loam mainly in that it is poorly drained, as it lies at a slightly lower elevation and the surface relief is everywhere prevailingly flat. The surface soil is gray or dark-gray loamy fine sand. The subsoil is pale yellow and, at a depth ranging from 20 to 24 inches, becomes mottled with light gray and rust brown.

Kalmia fine sandy loam, poorly drained phase, occurs in close association with typical Kalmia fine sandy loam. Because of its poor drainage, only a small proportion of the land is under cultivation. It does not drain so readily, water is likely to stand on the surface or to saturate the surface soil and subsoil, and it does not warm up so early in the spring as typical Kalmia fine sandy loam. Open ditches are necessary for drainage of this soil.

This poorly drained soil is used for practically the same crops as the typical soil, but the yields are prevailingly lower, owing mainly to poor drainage which affects the time of planting and cultivation of crops. Much of this soil is best used for pasture when limed and seeded to lespedeza and carpet grass.

Kalmia fine sand.—Kalmia fine sand differs from Kalmia fine sandy loam in that fine loose sand or loamy fine sand extends downward to a depth of more than 40 inches. The sand ranges in color from gray to light brown in the 3- to 6-inch surface layer and from yellow to brownish yellow in the subsoil. Both surface soil and subsoil are open and porous. Small areas of medium-textured sand are included, also spots of brown sand, which have a reddish-brown or yellowish-brown sand subsoil. The spots of brown sand are Cahaba fine sand.

Drainage ranges from good to excessive. This soil is developed in small areas on the second bottoms and terraces, mainly along Cahaba River in close association with Kalmia fine sandy loam. The soil is thoroughly leached and does not contain sufficient fine material to retain fertilizers and manures or to hold enough moisture to supply the needs of crops in very dry seasons. Only a small proportion of the land is farmed, and this is used principally for the production of cowpeas, velvetbeans, sweetpotatoes, watermelons, and garden vegetables. Forestry is probably the best use for Kalmia fine sand.

Leaf fine sandy loam.—Leaf fine sandy loam has a 6- to 8-inch surface layer of gray or brownish-gray fine sandy loam which grades into grayish-yellow fine sandy loam extending to a depth ranging from 12 to 20 inches. The subsoil is mottled yellow, gray, and light-red heavy plastic clay or fine sandy clay. The color mottlings are variable from place to place, but the structure remains fairly

constant. In the better drained areas yellow and reddish-yellow colors predominate in the subsoil, but in the more poorly drained spots the gray colors are more noticeable.

Leaf fine sandy loam occurs in some places in close association with the Kalmia and Cahaba soils, also along the streams where the material has been washed largely from the Susquehanna soils. The Leaf soil occupies slightly lower positions than the Kalmia and Cahaba soils, and drainage is not so well established, owing to the prevailing flat surface relief and to the heavy character of the subsoil.

About 60 percent of the land is under cultivation. Of this acreage, cotton occupies about 75 percent, and the remainder is devoted to the production of corn, sorgo, cowpeas, potatoes, and other farm crops. This soil is handled in practically the same way as Kalmia fine sandy loam, but the yields are generally slightly lower, except in a few areas where the land is well drained and has been properly handled.

Leaf clay loam.—Leaf clay loam differs from Leaf fine sandy loam mainly in the character of the surface soil which, in the clay loam, consists of a 2- to 4-inch layer of grayish-brown loam or fine sandy loam. The subsoil is similar to that of Leaf fine sandy loam. In places, clay extends to the surface, and in other places the fine sandy loam layer is thicker.

This soil is developed in small areas in a few flat places on the terraces along Cahaba River and along several creeks in the southwestern part of the county. It has poor drainage, owing to the flat surface relief and to the heavy character of the subsoil.

This is an inextensive soil of low agricultural value. Probably not more than 10 percent of the land is cultivated. It is difficult to till and warms up much later in the spring than Leaf fine sandy loam. It is used principally for cotton and corn. Yields of all crops are lower than on Leaf fine sandy loam. The best uses for Leaf clay loam are forestry and pasture.

Myatt fine sandy loam.—Myatt fine sandy loam occurs in small areas on the terraces and second bottoms along Cahaba River and Oakmulgee Creek. It represents some of the most poorly drained soil on these terraces or in the county. It occurs in close association with the Kalmia soils but lies at lower elevations. The land is nearly level or flat and is naturally poorly drained, water standing on the surface for rather long periods after heavy rains. All areas would require artificial drainage before cultivation could be attempted.

The surface layer is gray or dark-gray fine sandy loam extending to a depth of about 4 or 6 inches, where the material grades into yellowish-gray, mottled with rust brown, fine sandy loam or loamy fine sand. The subsoil is mottled light-gray and yellow or rust-brown fine sandy clay, or a mixture of loamy fine sand and clay, being slightly sticky and lumpy.

Only small spots are cultivated, and crop yields are low. Very little of the land is in pasture. The greater part is forested to sweetgum, black gum, water oak, willow oak, red oak, post oak, beech, and loblolly pine. Under present conditions the best use for Myatt fine sandy loam is forestry. If the areas were drained and seeded, fair pasture could probably be obtained.

Myatt silt loam.—Myatt silt loam differs from Myatt fine sandy loam principally in the finer texture of both surface soil and subsoil, and it is heavier structured in the subsoil. It is less well drained, some of it being in a semiswampy condition. It occupies slight depressions and is the most poorly drained land on the terraces. This is one of the inextensive and agriculturally unimportant soils of the county. It is of low fertility and, if drained, would be of low productivity, but it would probably make good pasture land if it were limed and seeded.

None of this land is under cultivation. About 20 percent of it has been cleared and used for pasture, and the rest is forested to the same kinds of trees as those growing on Myatt fine sandy loam. In addition to pasture, the best use of this soil is forestry, although the only trees growing on it do not have such high commercial value as the trees on the better soils.

Ochlockonee fine sandy loam.—The surface soil of Ochlockonee fine sandy loam consists of a 6- to 10-inch layer of brown, faintly mottled with rust brown, fine sandy loam which is mellow, friable, and easily tilled. It is underlain by a subsoil of brownish-gray, mottled with shades of brown, yellow, and gray, rather heavy fine sandy clay or friable clay. The Ochlockonee soils consist of material that has been washed down from the surrounding soils and deposited along the streams during periods of overflow. Ochlockonee fine sandy loam occurs in a few narrow strips in first bottoms along some of the streams in the central and northern parts of the county.

Owing to its position and the periodic destruction of crops by high water, the greater part of this soil remains forested, mainly to hardwoods, together with some pine. A few patches are planted to corn and sorgo, and some of the land has been cleared and used as pasture land. Acre yields of corn range from 20 to 40 bushels when not injured by overflow. The native grasses furnish excellent pasture during the spring and summer.

Ochlockonee silt loam.—Ochlockonee silt loam differs from Ochlockonee fine sandy loam in that both the surface soil and subsoil are browner and the surface soil is shallow and much finer textured. The surface soil is smooth mellow and friable brown silt loam, from 5 to 8 inches thick. The subsoil consists of light-brown or brown, mottled with light gray, silty clay loam or silty clay. This material is firm but fairly brittle and, in a few places, is rather heavy and tough.

This soil occurs in continuous and rather wide areas along Cahaba River and Oakmulgee Creek. It is subject to frequent overflow and is less well drained than Ochlockonee fine sandy loam.

Ochlockonee silt loam is naturally a strong soil, but it is barred from utilization for crops, on account of its low position, poor drainage, and the fact that it is subject to frequent overflow. Only a very small proportion of the land is cleared and under cultivation, but yields are higher than those obtained on Ochlockonee fine sandy loam. The soil is well suited to the production of corn and pasture grasses. When economic conditions warrant the increased production of crops, this soil could be made to produce good yields of corn and excellent pasture grasses if protected from overflow.

Meadow.—Meadow occurs as narrow strips in the first bottoms along the small streams in all parts of the county except the southwestern prairie section. It includes material so variable in color, texture, and structure that no soil type name could be assigned to it.

It ranges in color from light gray and reddish gray to dark gray; in texture, from sand, fine sand, or fine sandy loam to clay loam or clay; and in structure, from loose sand or loamy sand to compact and heavy sandy clay material.

Meadow consists of materials washed down from the sandy uplands and deposited in the first bottoms along the stream courses during periods of overflow, and it is subject to overflow during every heavy rain. Very little of this land is cleared and used for crop production. The principal crops grown are corn, sugarcane, and sorgo. Yields of these crops are very good where the land has been drained by surface ditches. A small proportion of the land has been cleared and is used as summer pasture.

Carpet grass and lespedeza are the principal grasses, and they furnish excellent grazing during the growing season. By far the greater part of meadow supports a forest growth consisting of sweetgum, willow, bay, water oak, and other water-loving vegetation.

CLAY UPLANDS AND PRAIRIES

The clay uplands and prairies occur exclusively in the southern end of the county, occupying about one-third of the total area. These soils are markedly different in color, texture, and structure from the soils of the sandy uplands and river terraces. The surface relief ranges from almost flat to gently rolling broad knolls and ridges with gentle slopes. The soils of this group lie at an elevation about 100 feet lower than the sandy uplands.

All these soils have heavy clay surface soils and extremely heavy clay subsoils. Both surface soils and subsoils are very plastic and tenacious when wet and, when dry, are hard, intractable, and crack and shrink badly. When plowed and cultivated under proper moisture conditions, the surface soils, especially of the members of the Houston, Sumter, and Bell series, crumble into coarse angular particles resembling buckshot. Most of these soils have fair or good natural surface drainage, but, owing to the impervious character of both surface soil and subsoil, internal drainage is extremely slow.

The clay uplands and prairie soils include both the true prairies, or limy soils, and part-prairie and part-timbered soils. This group, therefore, can be subdivided into the true prairies, which include the Houston, Sumter, and Bell soils, and the prairie and timbered soils, which comprise the Catalpa, Oktibbeha, Vaiden, and Eutaw soils.

The Houston, Sumter, and Bell soils, or the true prairie or limy soils, have never supported a tree growth worthy of mention but under natural conditions were covered with grass. This accounts for the large amount of organic matter and the black color of the Houston and Bell soils. The light color of the Sumter soils is owing largely to erosion and the shallowness of the subsoil.

These soils are derived from the underlying white soft limestone, or Selma chalk. This material is high in calcium carbonate and has influenced the soils to considerable extent. Outcrops of this limy

material are common, especially throughout the areas of Sumter clay, Sumter clay, mixed phase, and Houston clay, eroded phase. Considerable differences are apparent in the color and, to less extent, in the structure and lime content of these soils. These soils are readily distinguished from each other, and the differences are brought out in the individual descriptions of the soil types. The Houston soils are known as " black prairie " and the Sumter as " gray prairie." In some places no sharp line of demarcation can be drawn between the Houston soils and the Bell soils, as they are both black and grade into each other.

Practically all these soils are either farmed or used for the production of hay and pasture, but the type of agriculture is markedly different from that on the sandy uplands. The clay uplands and prairie soils are considered the premier grass soils, not only of the prairie section, but of the State. Nearly all the Houston, Sumter, and Bell soils are in hay land or devoted to grazing. The Bell and Houston soils are the best hay lands and also the best corn lands among the heavy clay soils. Johnson grass is the principal grass grown for hay, and some alfalfa is grown on the Houston and Sumter soils. Since the advent of the bollweevil, cotton cannot be successfully grown on the prairie soils.

The second subgroup consists of light-colored prairie and timbered soils and includes the Oktibbeha soils (the red prairie or post-oak land); the Vaiden soils (the yellow prairie); the Eutaw soils (the crawfish, gray prairie, or post-oak flatwoods) and Catalpa clay. These are timber soils and much of them is at present forested to post oak, white oak, shortleaf pine, loblolly pine, and hickory.

The surface soils of soils of this group range in color from red to gray and the subsoils from mottled red, yellow, and gray to mottled gray and rust-brown heavy impervious plastic clay. The areas are intermixed and closely associated with the true prairie soils, but these soils are derived from beds of heavy clay overlying the limestone. The nearness of the limestone to the surface has influenced the drainage, aeration, and oxidation of this material. As a result, the Oktibbeha soils are the best oxidized and the reddest soils in the prairies, and the limestone in most places occurs at a depth ranging from about 2 to 5 feet below the surface. The Eutaw soils have the flattest surface relief and are the most poorly drained soils in this group, they have more gray throughout both the surface soils and subsoils, and no lime concretions or limy material occur nearer the surface than 5 feet. The Vaiden soils are intermediate in color, position, and surface relief between the Oktibbeha and the Eutaw soils, and the subsoil becomes calcareous at a depth ranging from 4 to 5 feet below the surface.

The soils of this subgroup are used for growing cotton, a small amount of corn, and pasture grasses. The Eutaw soils are the least desirable prairie soils for pasture.

Houston clay.—Houston clay, commonly known as " black prairie land ", or typical prairie, has a 6- to 10-inch surface soil containing a considerable amount of organic matter and ranging in color from dark brownish gray to almost black. In cultivated fields the dry surface soil has a distinct rust-brown cast. The material is sticky and plastic when wet, extremely hard and compact when dry, and

in cultivated fields crumbles into a granular mass of buckshotlike granules. The subsoil, to a depth ranging from 8 to 15 inches, is bluish-gray clay having a faint rust-brown cast, being lighter in color and containing less organic matter than the surface soil. This layer is underlain by brownish-yellow or drab clay extending to a depth ranging from 30 to 50 inches and containing lime nodules in the lower part. This layer grades into the limy soft rock containing from 60 to 80 percent of calcium carbonate. The surface soil is neutral or slightly calcareous, and the subsoil, especially the lower part, is highly calcareous. The heavy plastic sticky clay subsoil becomes less plastic as the lime content increases. Crawfish have invaded some of the fields and have built up so many chimneys that their operations are changing the color of the surface soil and impairing its productivity. In some of the swales adjacent to areas of Bell clay, the surface soil is almost black or black heavy plastic clay extending to a depth of 8 or 10 inches. Locally, the included areas having a lighter colored surface soil are underlain by limy material at a comparatively slight depth.

Areas of Houston clay occur in the southern end of the county north of Uniontown, east and northeast of Antioch, and west and south of Willard Grove Church. The surface relief ranges from undulating to gently sloping, and surface drainage is good, but internal drainage is slow.

All the land is either under cultivation or is used for hay and pasture. This soil has been cultivated for a long time without the addition of fertilizer and has always been considered productive. Next to Bell clay, this is the best grass soil of the prairies, and the greater part of it is used for the production of Johnson grass hay which is native to it. Yields of hay range from 1 to 2½ tons an acre from 2 or 3 cuttings during the season. Corn yields from 15 to 30 bushels an acre, with an average of about 20 bushels. Corn is not fertilized. Cotton is still planted to some extent on this soil. The stalks make a rank growth, but the fruit is late in maturing, with the consequent destruction of much of it by bollweevils. Cotton yields range from failure in wet seasons to one-half bale or more an acre under more favorable conditions. The soil is fairly well suited to oats which yield from 30 to 50 bushels. Sorgo produces from 8 to 10 tons of silage. Numerous clovers grow naturally and these, together with Dallis grass, Bermuda grass, and a number of other grasses, furnish excellent pasture. This soil was formerly used to some extent for the production of alfalfa.

Houston clay, eroded phase.—Houston clay, eroded phase, differs from typical Houston clay in that practically all the black surface soil has been removed by sheet erosion, exposing the grayish-yellow or brownish-yellow heavy plastic clay subsoil. Only small areas of this soil occur, but they are noticeable on account of their color and low productivity. The land in general presents a very splotched or mottled appearance, owing to the presence of material brought up and deposited in the form of chimneys by crawfish.

This eroded soil occupies slopes, and sheet erosion has been, and is still very active where the soil is not protected by grasses. Practically all the land has been abandoned for cultivated crops and is now used for hay and pasture. Yields of hay are lower than on the

typical soil, and only a thin stand of pasture grasses grows on much of the land. It should be kept in pasture, as grazing is the best use for it.

Sumter clay.—Sumter clay, locally known as "gray prairie", "lime land" or "white land", differs from Houston clay in the color and structure of both the surface soil and subsoil, and also in the thinner subsoil layer. This soil is derived from the same kind of material as Houston clay, and much of it appears to be no more than the eroded Houston soil, but it contains less organic matter than that soil, and the white calcareous material is much nearer the surface. Sheet erosion is responsible for a large part of this soil. Doubtless some of it once had a covering of dark heavy clay like the Houston soil, but as it has been under cultivation 100 or more years and given no protection from washing, by terracing or continuous cover crops, the surface material has been largely removed by constant sheet erosion. In many places the partly weathered friable lime material, or Selma chalk, is exposed.

Sumter clay in its typical development is a yellowish-gray heavy plastic clay containing a small amount of organic matter. The color of the surface soil ranges from almost white to light brown or dark gray, depending on the amount of organic matter present, and the thickness ranges from 4 to 8 inches. In places the surface soil has been entirely removed, and the almost white or light-yellow clay subsoil lies at the surface. The subsoil, which ranges in depth from 18 to 24 inches, is pale-yellow or grayish-yellow clay, mottled with light gray and containing white soft lime nodules. The material is plastic when wet but is brittle and crumbly when dry. The subsoil grades into white soft limy material. The surface soil is calcareous, the subsoil is highly calcareous, and the underlying material contains the same amount of calcium carbonate as that underlying the Houston soil. Mapped with this soil are spots of Oktibbeha clay and Houston clay too small to show on a map of the scale used.

Sumter clay comprises 23.4 square miles in the county, and it is well distributed over the southern end. The largest areas are in the vicinity of Uniontown, south and west of Antioch, northeast of Providence, and southeast of Hamburg.

Since the advent of the bollweevil in 1914, much of this land has been abandoned for cultivated crops. Probably not more than 20 percent of it is now used for row crops, and of this amount about 90 percent is used for cotton. The rest of the land is used for hay and pasture or is lying idle. As on Houston clay, yields of cotton are very uncertain, on account of late maturing of the fruit and consequent destruction by the bollweevil. Cotton yields range from about one-eighth to one-half bale an acre, depending on the season, quantity of fretilizer applied, and cultural methods. The acre yield of Johnson-grass hay ranges from about one-fourth ton in dry seasons to about one-half ton under favorable conditions, and the yield of corn ranges from about 8 to 15 bushels. Some of this land is used for the production of alfalfa hay. Where the soil is protected from erosion and has been built up by the addition of organic matter, yields of alfalfa hay range from about 1½ to 3 tons an acre. Sweetclover and a number of the other native clovers do well. Where the soil is protected from erosion and is planted to grasses or cover

crops, it is capable of being built up to a profitable state of productivity within a few years.

Sumter clay, mixed phase.—Sumter clay, mixed phase, locally known as "mixed prairie", includes small areas of Sumter clay and Oktibbeha clay and a few spots of Houston clay and Vaiden clay so intricately mixed that their separation on a soil map of the scale used is impossible or impractical. In this mixed soil, Sumter clay seems to predominate, and much of the Oktibbeha clay is shallow to the underlying limy material. Throughout areas of Sumter clay, mixed phase, the plowed fields have a spotted appearance, as the color of the surface soil ranges from grayish yellow to almost black or even red.

Sumter clay, mixed phase, occurs in small scattered areas throughout the southern end of the county, closely associated with Sumter clay and Oktibbeha clay, principally south of Uniontown.

The surface relief ranges from gently rolling to sloping, and surface drainage is good. This mixed soil is developed through sheet erosion, that is, the surface soil of the once typical soils has largely been removed. The uncleared spots of Oktibbeha clay included in mapping this soil support a growth of shortleaf pine mixed with oaks and gums, but the Sumter clay spots were never forested and have always supported a grass vegetation.

The greater part of the soil of this mixed phase is either under cultivation, in pasture, or is used for the production of Johnson-grass hay. In general, the crops grown, yields obtained, and methods of farming and fertilization are similar to those practiced on Sumter clay. The best use for this soil is for pasture, as the land should be kept in grass to prevent further erosion.

Bell clay.—Bell clay is closely associated with the Houston, Oktibbeha, and Sumter clays, and it is composed mainly of material that has been washed down from areas of those soils and deposited in the depressions and at the bases of slopes. It is partly colluvial and partly alluvial in origin, as it occurs in gently sloping areas bordering the natural drainageways or in gently sloping terracelike positions.

The 8- to 12-inch surface soil consists of dark-gray or black heavy clay containing a large quantity of organic matter. The clay is extremely sticky and plastic when wet but assumes a coarse-granular structure when plowed under proper moisture conditions. The subsoil, to a depth ranging from 20 to 30 inches, is dark-gray or slightly bluish black heavy plastic clay mottled in places with rust brown. Below this the material is brownish-yellow or yellowish-gray clay which extends to a depth ranging from 48 to 60 or more inches, and in some places, calcareous material is reached in this layer. The surface soil is generally calcareous, owing to recently deposited material washed from the Sumter or Houston soils. In the more poorly drained areas bordering areas of Catalpa clay, the surface soil is brown or gray and the subsoil is gray, mottled with rust brown and yellow.

Bell clay occurs in narrow strips and small areas scattered throughout the southern end, or the prairie section, of the county. Although this soil lies above normal overflow of the streams, in many places it constantly receives thin sheets of water from the

adjacent upland slopes. Surface drainage is fairly good on the gently sloping areas and poor on the flat areas, but the heavy clay subsoil everywhere retards internal drainage. Deeper drainage can be provided by digging ditches to carry off the excess rain water.

Bell clay is the strongest and most productive soil in the prairie section, and all of it is either under cultivation to cotton, corn, and hay, or is used as pasture land. Probably 60 percent of this soil is used for the production of Johnson-grass hay, and the yields range from about 1½ to 3 tons an acre. Of the remainder, about 20 percent is used for the production of cotton and 15 percent for corn. Yields of cotton differ greatly under bollweevil conditions. As the soil is rich in nitrogen, it produces a rank stalk growth, but the fruit is late in maturing, with consequent destruction by the bollweevil. In wet seasons cotton may be a complete failure, but in dry seasons yields ranging from one-half to three-fourths bale or more an acre may be obtained. Yields of corn range from 20 to 50 bushels. A number of clovers, native to this section, together with Dallis grass and other grasses, make good growth on this soil and furnish excellent pasture during the greater part of the year. Recommendations for the improvement of Houston clay apply equally well to Bell clay.

Oktibbeha clay.—The surface soil of Oktibbeha clay, locally known as "red prairie" or "post-oak prairie", consists of a 3- to 5-inch layer of brown or reddish-brown heavy clay loam or clay. The upper subsoil layer, to a depth ranging from 8 to 12 inches, is yellowish-red or reddish-brown clay faintly mottled with yellow. Below this, and extending to a depth ranging from 20 to 50 inches from the surface, is an intensely mottled light-red and yellow clay, with here and there mottles of light gray and shades of red and yellow. The subsoil rests directly on white or pale-yellow soft limy material, or the Selma chalk formation. A sharp line of demarcation exists between the mottled heavy clay subsoil and the calcareous material. The surface soil and the upper subsoil layer are acid, but the lower subsoil layer may range from acid to neutral. In places limy material is near the surface. Both the surface soil and subsoil are composed of clay which is heavy and plastic when wet, but when dry the material is very hard, and it cracks and breaks into irregular-shaped lumps, these finally crushing down to a coarse mass. In the hayfields or land not cultivated, the soil checks and cracks during dry seasons. The cracks may extend to considerable depth, are irregular in shape, and may range from about one-fourth inch to an inch or more in width.

Oktibbeha clay is one of the extensive soils in the southern end of the county, the largest areas occurring south and southeast of Uniontown and smaller areas being scattered throughout the prairie section. This is a "post-oak prairie", and some of it is still forested to post oak and other oaks, hickory, sweetgum, black gum, and shortleaf pine.

This soil is characterized by a gently rolling or rolling and gently sloping surface relief. Natural surface drainage is good, but the movement of water through the surface soil and subsoil is slow, although the land is better drained than either the Vaiden or Eutaw soils. The presence of the friable limy material is re-

sponsible for the better drainage, oxidation, and aeration, and these agencies have produced the reddest surface soil and subsoil on the prairies.

About 40 percent of the land is under cultivation, and of this, 95 percent is in cotton, and the remaining 5 percent is used principally for corn, cowpeas, and soybeans, with a few acres in peanuts. The farmers rightly consider this and the associated Oktibbeha fine sandy loam the best cotton soils in the prairie section under bollweevil conditions. Yields of cotton differ widely, ranging from about one-eighth to three-fourths bale an acre, depending on the season, destruction by the bollweevil, the kind and quantity of fertilizer applied, and cultural methods. About 30 percent of the land is devoted to hay and pasture, the hay being mainly Johnson grass which yields from about one-half to three-fourths ton an acre under present methods of handling the soil. Johnson grass, lespedeza, Dallis grass, and Bermuda grass constitute the principal pasture grasses. Where the land is plowed, or oats are used in a rotation with hay crops, better yields and a better quality of hay are produced than on fields which have become infested with weeds and broomsedge.

Oktibbeha clay, like all other clay soils in the prairie section, owing to its heavy texture and compact structure, is naturally difficult to till. When plowed too wet it runs together, and it bakes on drying, and if plowed too dry it breaks into large clods that interfere with cultivation. Lime and the incorporation of organic matter are very beneficial to this soil. The underlying lime can be dug out and placed on the land at no cost, except for labor.

Oktibbeha fine sandy loam.—Oktibbeha fine sandy loam differs from Oktibbeha clay in the character of the surface soil, that is, this soil has a surface covering of brown or yellowish-brown fine sandy loam to a depth of about 5 inches, underlain by a 4- to 6-inch layer of brownish-yellow or reddish-yellow loamy fine sand. The subsoil is reddish-yellow or reddish-brown heavy plastic clay which grades, at a depth ranging from 12 to 20 inches, into reddish-yellow heavy plastic clay mottled with red, gray, and yellow. This material continues to a depth ranging from about 30 to 60 inches and grades into brownish-yellow and white soft limy material.

Small areas of Oktibbeha fine sandy loam occur northeast of Uniontown, north of Coleman, and around Zimmerman. The relief is featured by low and smoothly rounded ridges and gentle slopes. Surface drainage is well established, but the heavy subsoil interferes with internal drainage.

This soil is much easier to handle, is adapted to a wider range of crops, and is more productive than Oktibbeha clay. The sandy surface soil enables it to absorb more moisture, heat, air, and light, and it, therefore, warms up earlier in the spring than Oktibbeha clay.

About 90 percent of the land is under cultivation. Of this, at least 80 percent is used for cotton, and the remainder for corn and minor crops, such as peas, peanuts, potatoes, and sorgo. Cotton is fertilized with applications ranging from 150 to 400 pounds of a 4–8–4 or 3–9–3 mixture. Yields range from one-fifth to three-fourths bale an acre, depending on the season, cultural methods, and quan-

tity of fertilizer applied. Yields of corn, where planted alone on this soil, are so low and the ears so inferior that the farmers have adopted the practice of planting corn at intervals of 20 feet each way across the cotton fields, in order to obtain sufficient good ears to feed their work animals, as, planted in this manner, large perfect ears of corn form. Cowpeas, sweetpotatoes, and garden vegetables do well. Bermuda grass and Johnson grass furnish some pasture.

Vaiden clay.—Vaiden clay is locally known as "yellow prairie." It is an intermediate soil, as regards color and drainage conditions, between the Oktibbeha and the Eutaw soils. Vaiden clay, to plow depth, which is seldom more than 4 inches, is brown heavy clay loam or clay, having a light reddish-yellow cast. Beneath this is brownish-yellow clay containing fine mottlings or shades of red, brown, and gray. Most of the red mottlings are in the upper part of the subsoil, and they fade out with depth, although they may extend to a depth of more than 2 feet. At a depth of about 18 or 20 inches, the material is yellow or brownish-yellow clay, with faint shades of gray, brown, and in some places red. This material grades at a depth of about 40 inches into olive-drab or mingled shades of brownish-yellow and gray clay which, at a depth ranging from about 65 to 70 inches, contains some white lime nodules. The entire soil mass is heavy stiff clay from the surface downward. It is plastic when wet and shows no definite fracture planes when dry. This material is underlain by the rotten limestone, or Selma chalk, at a depth ranging from about 5 to 8 feet.

Vaiden clay occupies low elongated ridges with gently sloping sides leading down to the intermittent drainageways. The surface run-off of rain water is generally good, but the heavy character of the subsoil retards the movement of water. However, the soil seems to have the capacity to absorb and retain sufficient moisture for the use of many crops, especially cotton.

Vaiden clay occurs in the northern and central parts of the prairie section of the county, the largest areas lying south of Clovervale, south of Antioch, south of Coleman, and west and northwest of Hickory Grove.

About 90 percent of the land is cleared and under cultivation, and practically all of it is used for the production of cotton. Yields of cotton differ with the seasons, cultural methods, and the kind and quantity of fertilizer used. They range from almost failure in very wet seasons to one-half bale or more under more favorable growing conditions, the average being one-fourth bale under present boll-weevil conditions. The corn produced on this soil is planted in the same manner as on Oktibbeha fine sandy loam.

This soil, like the associated heavy prairie soils, warms up late in the spring, and cotton planted on it is late in maturing fruit, hence the damage done by the bollweevil is much more severe than on the lighter sandy soils. A few patches are devoted to cowpeas, peanuts, and sorgo, and these crops seem to give as good returns as on Oktibbeha clay. Johnson grass does better on this soil than on Eutaw clay.

Table 6 gives the results of mechanical analyses of samples of the surface soil, subsurface soil, and several layers of the subsoil of Vaiden clay.

TABLE 6.—*Mechanical analyses of Vaiden clay*

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
417046	Surface soil, 0 to 3 inches	0.2	0.2	0.5	1.3	11.9	35.2	50.8
417047	Subsurface soil, 3 to 6 inches	.0	.1	.2	.7	5.5	22.8	70.7
417048	Subsoil, 6 to 24 inches	.0	.1	.4	.3	5.0	20.4	73.7
417049	Subsoil, 24 to 40 inches	.0	.2	.2	.5	4.5	21.0	73.5
417050	Subsoil, 40 to 72 inches	.4	.5	.3	.6	4.4	20.6	73.2

Vaiden fine sandy loam, buckshot phase.—Vaiden fine sandy loam, buckshot phase, differs from Vaiden clay in that it has a 4- to 6-inch fine sandy loam surface layer, a considerable quantity of small rounded brown iron concretions on the surface and throughout the soil mass, and a noticeable quantity of fine sand in the subsoil.

Owing to differences in drainage and surface relief, variations occur from place to place in the color of the surface soil and subsoil and in the quantity of buckshot concretions. In the lower situations, the surface soil is dull-brown fine sandy loam underlain by dull-yellow heavy and plastic clay containing some fine sand. In these situations, the iron concretions are very numerous. On the gentle slopes and low broad ridges the topsoil and the subsoil are similar in color to the corresponding layers of Vaiden clay, and the concretions are not so numerous as in the lower situations, but they are sufficiently so to give the soil in these areas the buckshot classification. The concretions on the surface and in the topsoil are hard, but in the subsoil they are soft and break up easily, giving the soil material a brown or black streaked appearance when crushed with a soil auger or spade.

Soil of this phase occupies flat or gently sloping areas and some low broad elongated smooth-sided ridges. Surface drainage in most places is good, but the movement of water through the subsoil is slow, owing to its heavy structure. This soil occurs in close association with the other Vaiden and the Oktibbeha soils.

Practically all the land is cleared and under cultivation, about 90 percent of it being used for cotton, and the remainder for corn, cowpeas, sorgo, and crops of minor importance. Yields differ according to the season and cultural methods, but they average higher than those obtained on Vaiden clay. This soil is easy to till and responds readily to fertilization.

Eutaw clay.—Eutaw clay is locally known as "crawfish prairie" or "post-oak flatwoods." It differs from Oktibbeha clay and Vaiden clay in the color of the soil mass, drainage conditions, and depth to calcareous material. This soil occupies broad flat or undulating and very gently sloping areas, and this position, together with the texture, structure, and, probably, the depth to calcareous material, results in poor drainage which, as a whole, is deficient. Water stands on the more level areas or in slight depressions after heavy rains. Crawfish chimneys are common. The drainage and the fact that this soil is more poorly oxidized than Oktibbeha clay and Vaiden clay are probably owing in large measure to the fact that the subsoil extends to a depth ranging from 6 to 10 feet, below which the more porous calcareous material is reached.

The surface soil of cultivated fields, to a depth of 3 or 4 inches, the ordinary depth of plowing, is grayish-brown or rust-brown heavy plastic clay. Recently cleared land, or soil which contains considerable organic matter, has a somewhat coarse granular structure when plowed under favorable moisture conditions. The subsoil is mottled light-gray, brownish-yellow, and rust-brown heavy plastic clay extending to a depth ranging from 5 to 8 feet. In most places, at a depth ranging from about 30 to 40 inches, the light-gray color becomes more pronounced and continues downward to the underlying calcareous material. Red or reddish-brown mottles may occur here and there at different depths throughout the subsoil.

Eutaw clay is one of the extensive soils in the prairie section of the county. Long broad belts are south of Zimmerman and around Coleman, and large areas are in the vicinity of Hamburg.

Eutaw clay is a difficult soil to handle, and yields of crops are very uncertain. In dry seasons the soil cracks badly and becomes very hard and intractable. Probably 10 percent of the land is under cultivation, practically all of it to cotton. Yields of this crop range from complete failure in wet seasons to one-fourth bale or more an acre under more favorable conditions. The soil generally produces a good-sized stalk, but the fruit is late in developing, with consequent destruction of the squares and young bolls by weevils. Before the advent of the bollweevil this soil produced from one-fourth to one-half bale or more of cotton an acre. Practically all the corn grown is planted in the same manner as that on Oktibbeha fine sandy loam, and farmers claim that the best ears are obtained by this method. During the course of the survey, a number of patches planted to corn were noticed, in which the stalks were well developed, but on the old soil only small ears, or nubbins, were produced, and on the new land or on the soils well supplied with organic matter, fairly good ears were produced. These observations are substantiated by a number of farmers who have cultivated this soil for a long time. A few patches of peanuts and cowpeas are grown by most farmers on this soil, but the yields are only fair. Sorgo does fairly well under favorable moisture conditions, the acre yields ranging from 5 to 8 tons of forage, or from 60 to 75 gallons of sirup. Johnson grass does not seem to thrive, except where the soil receives wash from the higher lying calcareous soils. From 5 to 8 percent of the land is in pasture, consisting of lespedeza, broomsedge, sedges, and coarse weeds. Possibly this soil could be seeded to pasture grasses, and fairly good grazing might be obtained where the weeds are mowed. The timbered land supports a good growth of valuable hardwoods and shortleaf pine.

Eutaw very fine sandy loam.—Eutaw very fine sandy loam differs from Eutaw clay mainly in having a surface covering of very fine sandy loam. The 4- to 6-inch surface layer consists of dull-brown or grayish-brown, mottled with rust brown, very fine sandy loam. It is underlain by grayish-yellow, slightly mottled with gray and rust brown, heavy very fine sandy loam. The subsoil is similar in color and structure to the subsoil of Eutaw clay. A small quantity of very fine sand is present in most places in the subsoil but not enough to counteract the heavy sticky plastic condition.

This soil is developed mainly in one large area around Tayloe, and smaller bodies are scattered in the prairie section of the county. Most of the bodies occupy higher positions than Eutaw clay and in general have better surface drainage. The soil is easier to handle and is adapted to a wider range of crops than Eutaw clay.

About 50 percent of Eutaw very fine sandy loam is under cultivation, and the remainder is in woods and pasture land. Of the cultivated acreage about 90 percent is used for cotton, and small patches are planted to corn, sorgo, cowpeas, peanuts, and sweetpotatoes. Yields of cotton range from about one-fifth to one-third bale an acre, and yields of other crops are slightly higher than on Eutaw clay.

Catalpa clay.—Catalpa clay consists of materials washed down from the surrounding prairie soils and deposited in the first bottoms along the streams during times of overflow. This soil occurs for the most part as narrow strips, but some wide and long bottoms are developed in the southern end of the prairie section of the county. It differs from Bell clay in that it is subject to frequent and destructive overflow and in that it is lighter colored in both surface soil and subsoil.

The surface soil is gray, dark-gray, or brownish-gray clay. It is underlain by a gray or drab, mottled with light gray and rust brown, clay subsoil extending to a depth of several feet. Both the surface soil and subsoil are extremely heavy clay, which is plastic and sticky when wet and very hard when dry. The soil throughout is acid, except where some material from the Sumter and Houston soils has recently been washed down and deposited. It is less well drained than Bell clay, owing to its nearly level surface relief and low position.

Only a small proportion of Catalpa clay is under cultivation, and the remainder is in pasture or in forest consisting of sweetgum, ash, hackberry, willow oak, post oak, red oak, white oak, hickory, elm, ironwood, and some other hardwoods, together with an undergrowth of switch cane and other grasses and briers. The pasture land in many places supports a good growth of native grasses. Corn is the principal crop, and acre yields range from 15 to 40 bushels. From 20 to 30 percent of this land is used for Johnson-grass hay, acre yields of which range from 1 to 2½ tons. Since the advent of the bollweevil the yield of cotton has been very uncertain. Some velvetbeans are interplanted with corn and do fairly well.

AGRICULTURAL METHODS AND MANAGEMENT

The agricultural methods practiced in Perry County are essentially the same as those in vogue throughout the prairie section of the State. Perhaps more than two-thirds of the farmers use a 3–8–3 or 4–8–4 fertilizer for cotton and apply from 200 to 400 pounds an acre. Some farmers apply from 75 to 100 pounds of nitrate of soda to cotton when it is chopped. Corn is usually given a top dressing ranging from 100 to 150 pounds of nitrate of soda when it is about 2 feet high. If corn follows a legume which has been turned under, no nitrate of soda is used.

The Alabama Agricultural Experiment Station at Auburn, through field tests, has ascertained that the best fertilizer for cotton [3] on soils in this region consists of a mixture of 100 pounds of nitrate of soda, 200 pounds of superphosphate, and 25 pounds of muriate of potash. The most profitable returns are obtained where an acre application of 650 pounds of this mixture is made. In the experiments, all the superphosphate, all the potash, and one-fourth of the nitrogen were applied in the bed immediately before planting, and the remaining three-fourths of the nitrogen was applied just prior to the first cultivation, after the cotton was chopped. This recommendation is for all soils in this region. At this time (1930) fertilizer recommendations for the individual soil types have not been worked out, but experiments are now being made at the substations located on the large and agriculturally important soil types of the State.

According to field tests made by the experiment station, nitrate of soda has given more profitable returns than cottonseed meal for cotton in every trial on soils in this part of Alabama.

According to Scarseth: [4]

> Limited reports from Black Belt farmers indicated that they had not received much response from phosphorus fertilization when applied in amounts common in farm practice, i.e., 150 to 400 pounds per acre of superphosphate. These studies pointed to the probability that the Black Belt soils possessed very great capacities for fixing soluble phosphates into forms unavailable for plants. * * *
>
> The greenhouse tests showed that most of the soils in the Black Belt gave great response to heavy applications of superphosphate but little response to potash.
>
> The phosphorus experiments on several soils showed that maximum response to superphosphate fertilization was not obtained until the rate of application was equivalent to 2,000 pounds per acre. The efficiency of this phosphate decreased rapidly with the period of time it was in contact with the soil before planting the crop, thus indicating that these soils have a great phosphate-fixing capacity.

A number of varieties of cotton, as well as of corn, are grown. The most popular varieties of cotton are Cook 1010 and Half-and-Half, and of corn are the Prolifics and Tennessee Red Cob. Corn is not generally fertilized, but some farmers apply about 150 pounds of nitrate of soda when the corn is about 2 feet high, with profitable results.

Some oats are grown by most of the farmers on the larger farms. Red Rustproof is the most popular variety. Oats are sown either in the fall or in January or February. The fall-sown oats give the highest yields but are sometimes killed by freezes. Where not fertilized with barnyard manure, a top dressing of about 200 pounds of nitrate of soda is usually applied in early spring.

A small patch of sorgo, ranging from about one-half to 1 acre, and some sugarcane are grown on practically every farm. Sirup is made for home use, and some farmers feed some of the sorgo cane

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[3] WILLIAMSON, J. T., and FUNCHESS, M. J. FERTILIZER EXPERIMENTS WITH COTTON. Ala. Agr. Expt. Sta. Bull. 219, 24 pp., illus. 1923.
——— FERTILIZER EXPERIMENTS WITH COTTON. Ala. Agr. Expt. Sta. Bull. 228, 31 pp. 1929.

[4] SCARSETH, G. D. MORPHOLOGICAL, GREENHOUSE, AND CHEMICAL STUDIES OF THE BLACK BELT SOILS OF ALABAMA. Ala. Agr. Expt. Sta. Bull. 237, 48 pp., illus. 1932.

to work animals, hogs, and cows. The cane does best on moist soils and is usually planted on the slopes or lower lying soils.

No definite system of crop rotation is practiced. A good crop rotation is recognized as an essential part of a good system of crop production, and every farmer should adopt a definite plan of rotation. One of the best rotations thus far suggested by the experiment station is the following: First year, corn with cowpeas (Iron or Brabham) (velvetbeans or peanuts may be used instead), followed by oats in the fall; second year, soybeans, cowpeas, or peanuts; third year, cotton, followed by winter peas, vetch, or rye. This rotation can be modified to meet the conditions on the individual farm.

Some farmers, who have followed a rotation similar to the one described, in which legumes, such as peas and beans, were interplanted with corn and winter peas or vetch sown in the cotton middles in the fall, have improved the soil and have more than doubled former yields. These farmers, by planting winter cover crops, have prevented much erosion and leaching of the soils, and at the same time much organic matter has been added, which renders the soil more retentive of moisture, in addition to supplying the needed nitrogen. When nitrogen can be obtained by this method, less nitrate fertilizer is required. Also, when a good supply of organic matter is present, mineral fertilizer gives a much better response.

Some farmers are terracing their land properly and cultivating rolling lands that would otherwise be subject to serious erosion. However, some terraces are not built wide enough or sufficiently high or are not given the proper grade to prevent breaking during ordinary rains. When these breaks occur, considerable damage is done. Terraces constructed at the Black Land substation at Marion Junction, are 15 feet wide at the base and are 3 or 3½ feet high in the center. These have proved efficient, and such terraces can be cultivated without waste of land. Throughout the prairie section very little attempt has been made to check erosion on the heavy clay soils, and considerable damage has been done to these soils through constant sheet erosion. Many areas of these once productive soils in the Black Belt have been eroded to the underlying Selma chalk formation. Erosion and gullying in the hilly sandy uplands are very destructive and have caused many once valuable farms to be abandoned. In these uplands, the sandy loam surface soil has not only washed off, but deep wide gullies have been made in the subsoil and in the underlying clays and sands.

Some of the owners of the hilly sandy land are preventing the annual burning over of the woods, and as a result some of this land has reseeded to longleaf and shortleaf pines. It is said that most of the soils of Perry County can be reclaimed and reforested if the young trees are protected from fires and hogs.

Some of the better farmers, by liming the acid soils, have increased the yields of crops. This not only corrects the acidity but slightly improves the physical condition of the soil. The lime used is taken from the material underlying the Sumter soils and spread over the land. Millions of tons of lime are available throughout

the prairie section, where it lies near the surface and outcrops in many places. The rotten limestone is soft and crumbly and can easily be loaded on wagons and distributed over the surface of the land. A much larger quantity of this material than of burnt lime would be required. Lime has proved beneficial to some crops on the sandy soils, especially peanuts and other legumes.

The prairie soils are so heavy in texture, so compact in structure, and so intractable that plowing is done to only a slight depth. It is difficult to keep the plow in the ground unless it is heavily weighted, and when this is done, it requires heavy work animals or strong machinery to pull it. Where the soils have been plowed to a depth ranging from 4 to 6 inches, much better results are obtained, much less cracking of the surface soil occurs, and hence more moisture is held in both the surface soil and subsoil. The depth of plowing on these heavy soils should be increased gradually each year until the desirable depth of 6 or 8 inches is obtained, instead of plowing to a depth of only 2 or 3 inches, a practice now prevalent.

Many farmers are realizing the serious effects of leaching of soluble plant nutrients and the washing away of the finer material in the soil during heavy rains. This is especially true of the soils subject to clean cultivation, and the farmers are sowing more cover crops in order to keep the soils covered throughout the winter.

Data on the lime requirements of the different soils in the county may be obtained from the Alabama Agricultural Experiment Station, Auburn, Ala. The results obtained from the Black Lands substation, near Marion Junction, are applicable to the prairie soils of the county.

SOILS AND THEIR INTERPRETATION

Perry County is located in the Gulf Coastal Plain in the west-central part of Alabama. It lies in the region where light-colored yellow and red soils predominate, but it includes areas of dark-colored prairie soils. These prairie soils are rendzinas and in that respect differ from the prairie soils of Illinois. Considerable difference exists between the elevation of the prairie section and the elevation of the highest part of the so-called " sandy section " of the county. The average annual rainfall is nearly 50 inches, and the mean temperature is about 64° F.

The soils, with the exception of the true prairie soils of the Houston, Sumter, and Bell series, originally supported a forest growth of deciduous trees and pines. All the soils are light colored, and, with the exception of the Houston and Bell soils, they contain a very small quantity of organic matter. The virgin areas of the timbered soils contain a noticeable amount of vegetable matter in the topmost inch or two of the surface soils.

Within the memory of man, the calcareous soils in the prairie section have not supported a forest growth worthy of mention, but grasses have grown for a long time, which accounts for the dark color and high content of organic matter in the Houston and Bell soils. In the Sumter soils, the most calcareous soils of the prairies, erosion has kept close pace with weathering, and the surface soils are light colored.

Leaching, or the washing out of the alkalies and alkaline earths, has been extensive and is still going on. This accounts for the fact that the surface soils contain less plant nutrients than the subsoils. In this region of heavy rainfall and warm temperature, leaching is continuous throughout the year.

Erosion and gullying are extremely serious throughout the northern half of the county. They are much more noticeable in the extensive areas of the Guin, Ruston, Luverne, and Orangeburg soils than in the prairie soils. Sheet erosion is severe throughout the areas of Houston, Sumter, Vaiden, and Oktibbeha soils. Over the greater part of Sumter clay, sheet erosion is and has been destructive, in that the surface clay in many places has been removed, exposing the underlying Selma chalk formation. Erosion has not only changed the surface features of the fields since the land was cleared but has changed the texture of the soil and destroyed once normal soil profiles. In many places the sandy surface material has been entirely removed, laying bare the unweathered formation of the underlying heavier material. Particularly is this true in the northern part of the county.

All the soils, with the exception of the Sumter, Houston, Bell, and Catalpa, range from slightly acid to strongly acid.

Table 7 gives the mean, minimum, and maximum pH values of the soil material from different horizons of the principal soils in the black-belt section of the county.

TABLE 7.—*Mean, minimum, and maximum pH values of the soil material from different horizons of the principal black-belt soils of Perry County, Ala.*[1]

Soil type	Horizon	Tests	Mean	Minimum	Maximum
		Number	*pH*	*pH*	*pH*
Oktibbeha clay	A	20	5.6	4.5	7.1
Do	B_1	12	5.2	4.7	6.9
Do	B_2	4	5.1	4.8	5.3
Do	Chalk	2		7.5	8.0
Vaiden clay	A	5	5.1	4.3	5.8
Do	B_1	3	4.8	4.4	5.2
Do	B_2	1	4.9		
Eutaw clay	A	11	5.3	4.7	6.4
Do	B_1	6	4.9	4.5	6.2
Do	B_2	2		5.2	6.1
Sumter clay	A	18	7.4	7.3	8.0
Do	Chalk	4	7.5	7.4	7.7
Houston clay	A	4	7.1	6.8	7.4
Do	B_1	2		6.8	7.3
Do	B_2	3	7.3	7.3	7.4
Bell clay	A	2	7.5		
Catalpa clay	A	1	7.5		

[1] See footnote 4, p. 35.

The Sumter soils are highly calcareous, and they grade at a very slight depth into the soft rotten limestone. Calcareous material is also present at a depth of 6 feet or more under the Vaiden and Eutaw soils.

According to Smith,[5] three distinct geological formations occur in this county—the Selma chalk, the Eutaw, and the Tuscaloosa. The

[5] SMITH, E. A., JOHNSON, L. C., and LANGDON, D. W., Jr. REPORT ON THE GEOLOGY OF THE COASTAL PLAIN OF ALABAMA. 759 pp., illus. 1894.

Selma chalk formation, or rotten limestone, is white or very light gray chalk limestone, exposing in some places clearly defined bedded planes. The chalk, or limestone, was deposited on the sea floor at the end of the Cretaceous period and was doubtless formed as calcareous more or less muddy oozes which gradually accumulated on the bottom of a clear and moderately deep sea. The Selma chalk formation underlies all the soils of the prairie section. The weathering of this soft limestone has given rise to the Sumter, Houston, and Bell soils, and the same material underlies the B horizon of the Oktibbeha soils. The beds of heavy clays, superimposed on the Selma chalk, have given rise to the Oktibbeha, Vaiden, and Eutaw soils.

Lying north of the prairie region and Selma chalk formation and passing under it, the Eutaw formation crosses the central part of the county and extends northwestward almost to the northwestern corner. It consists of thinly bedded and laminated light-gray or bluish-gray clays and yellow fine micaceous sandy material. This formation in many places contains a noticeable quantity of finely divided mica scales. The weathering of this material has given rise to two important soil series, the Akron and Luverne and, in places, perhaps has influenced the Susquehanna soils.

The Tuscaloosa formation, consisting of light-colored irregular or cross-bedded bodies of sands and joint clays and some gravel, underlies the northern end and the northeastern part of the county. It gives rise to the Orangeburg, Ruston, and Red Bay soils and also to extensive areas of Guin soils, undifferentiated.

Two main groups of soils are developed in Perry County—one including soils which have normal soil profiles and the other including soils which have not developed normal soil profiles, owing to erosion, gullying, poor drainage, aeration, and oxidation. The first group includes soils of the Orangeburg, Luverne, Akron, Ruston, Red Bay, Cahaba, and Kalmia series. The most striking features of the texture profile of these well-developed soils are a comparatively light textured A horizon, a heavier textured B horizon, and a third, still deeper, horizon which may vary considerably in texture but which, in most places, is heavier than the A horizon and lighter textured than the B horizon. The C horizon consists of the unconsolidated geological material which is extremely variable in structure and color. The B horizon is the uniformly colored and most thoroughly oxidized layer in the profile. These soils show the influences of eluviation in the A horizon and illuviation in the B horizon, and they are the most thoroughly aerated and best drained soils in the county, and, in addition, oxidation of the iron salts is more complete than in any other soil. This accounts for the intensely red color of the B horizon to a depth of several feet in many of these soils.

Orangeburg fine sandy loam may be considered the normally developed soil of the county and the soil which expresses the climatic influences of the region. A profile description of a virgin area, as observed 4 miles northwest of Marion, is as follows:

A_1. 0 to 4 inches, light grayish-brown loamy fine sand containing a small quantity of organic matter and plant roots.

A_2. 4 to 16 inches, light brownish-yellow mellow and friable loamy fine sand having a single-grain structure.

B_1. 16 to 65 inches, red friable fine sandy clay which breaks readily into various-sized lumps that are easily crushed to a fine-granular mass. The material is faintly mottled with yellow at a depth of 55 or 60 inches.

C. 65 to 90 inches +, light-red fine sandy clay mottled or streaked with yellow and shades of red and yellow, with an approach to gray in places. The material is slightly compact but very brittle and friable.

The Luverne soils differ essentially from the Orangeburg soils in the character of the B horizon and to some extent in the material of the C horizon. The upper part of the B horizon is heavy tough compact clay, as contrasted to the friable sandy clay of the B horizon of the Orangeburg soils, and the lower part is light-red fine sandy clay which is heavy but friable and in most places contains some small mica scales.

The soils of the Akron series have 4- to 6-inch brown or reddish-brown fine sandy loam surface soils and dark-red heavy compact extremely stiff clay B horizons. At a depth ranging from 48 to 72 inches, red clay, mottled or streaked with yellow, is present. The pH value of the surface soil is 6.43; of the upper part of the subsoil, 7.12; and of the lower part of the subsoil, 7.12.

The Red Bay soils bear the same relation to the Akron as the Orangeburg soils do to the Luverne. Associated with the Red Bay soils are extensive areas of Ruston soils which have a red or yellowish-red friable sandy clay B horizon. The Susquehanna soils are characterized by either light-colored sandy or red clay surface soils and by heavy plastic clay B horizons, mottled red, yellow, and gray.

Houston clay, as regards its profile development, is a rendzina. Rendzina is a term applied to black soils whose color is due to the effect of inheritance from the parent material rather than to the action of external forces and conditions. The Houston soil owes its black color to the preservation of organic matter through the agency of lime inherited from the parent material, rather than to the climatic forces of the region. In this climate the tendency would be for Houston clay to lose its organic matter and free calcium carbonate and finally develop a red B horizon.

A description of a profile of Houston clay, as observed 1 mile south of Porters School, is as follows:

A_1. 0 to 7 inches, dark brownish-gray or almost black clay. Plowed fields have a rust-brown cast when dry.

A_2. 7 to 16 inches, dark-gray or bluish-gray clay which is a little lighter in color and contains less organic matter than that in the layer above. The material in the two layers is extremely sticky and plastic when wet, and it is very hard and checks and cracks on drying.

B_1. 16 to 20 inches, brownish-yellow clay which is heavy and extremely plastic and tenacious.

B_2. 20 to 40 inches, brownish-yellow clay which is less tenacious than the clay in the B_1 layer and contains a few lime nodules.

C. 40 to 58 inches+, light-yellow sticky and friable clay mixed with white hard or soft lime nodules.

The Sumter soils in many places may be considered eroded Houston soils. They have light-gray or yellowish-gray A horizons, pale-yellow, grayish-yellow, or creamy-white B horizons, and, in most places, between depths of 20 and 40 inches, the soil material grades into white blocky sandy limestone or Selma chalk.

The Oktibbeha, Vaiden, and Eutaw soils are part-prairie and part-timbered soils. The main differences between the soils in this subgroup are probably due to the thickness of the heavy clay material overlying the Selma chalk. Where the clay material is thin a soil profile has developed, which, in its color characteristics, expresses, to a considerable degree, the climatic influence of the region. This is Oktibbeha clay. The calcareous material is reached in most places at a depth ranging from 20 to 50 inches below the surface, and this has resulted in better drainage and allowed aeration and oxidation of the overlying clays. This is by far the best oxidized prairie soil.

Vaiden clay, considering oxidation and aeration, is intermediate in its characteristics between the brown Oktibbeha soils on the one side and the poorly drained Eutaw soils on the other.

All the black-belt soils are immature, with respect to climate. The Houston and Sumter clays are abnormal soils for this climate, because they contain large amounts of calcium carbonate. If erosion were not continually exposing fresh chalk and removing the residue from the weathering of the chalk, these soils would develop normal profiles and, in the course of time, become acid, and finally, as maturity is attained, take on the characteristics typical of mature soils for this climate. One of the series of soils in Alabama that may be regarded as representing typical mature soils for a climate similar to that of the black belt is the Cecil. The Cecil soils occupy the southern end of the Piedmont soil province. These soils are characterized by having colloidal fractions whose chemical composition shows a molecular ratio of silica to alumina of about 1.8.

The order of the magnitude of the buffer and base-exchange capacities varies inversely with the degree of weathering, or these could be expressed as varying inversely in order of magnitude with the silica-sesquioxide ratio. Eutaw clay, with a ratio of 2.31, is highly mottled yellow and gray clay, and Oktibbeha clay, with a ratio of 1.90, is uniformly red, whereas the Lufkin soil, mapped in some other counties of Alabama, has a high ratio of 3.85.

Baver, working with these clay soils, found that the Eutaw was more plastic than the Oktibbeha. The plasticity of these soils also ranged in order of magnitude with the silica-sesquioxide ratio. Houston and Sumter clays were the least plastic, a result which would be expected because of their high calcium content.

Bell clay is developed around the drainage heads and very gentle slopes in the prairies, and it represents material, both colluvial and alluvial, washed down from surrounding Houston, Sumter, and Oktibbeha soils. It has a dark-gray or black surface soil and a gray subsoil, the materials in both horizons being heavy and plastic. Catalpa clay differs from Bell clay in that it is lighter in color and is alluvial material deposited in the first bottoms by streams rising in and flowing through prairie soils. The Ochlockonee soils occur in the first bottoms and are derived from material washed from the sandy uplands. They are developed principally along Cahaba River.

The Myatt soils are characterized by dark-gray or dingy-gray surface soils, and yellowish-gray or gray, mottled with rust brown, friable subsoils. They represent poorly drained terraces. The Leaf soils differ from the Myatt soils in having a slightly lighter color

in the surface horizon and heavy plastic light-gray clay subsoils, mottled with yellow, brown, and red.

Guin soils (undifferentiated) represent a soil condition developed through erosion of different soil types. Its areas include spots of Ruston, Susquehanna, Orangeburg, and Luverne soils so intricately mixed and so badly gullied that no separation into soil types could be made.

Meadow is alluvial material, so variable in color, texture, and structure that no soil type distinction could be made. It occurs in the first bottoms and is subject to overflow after every heavy rain.

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To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by:

(1) mail: U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

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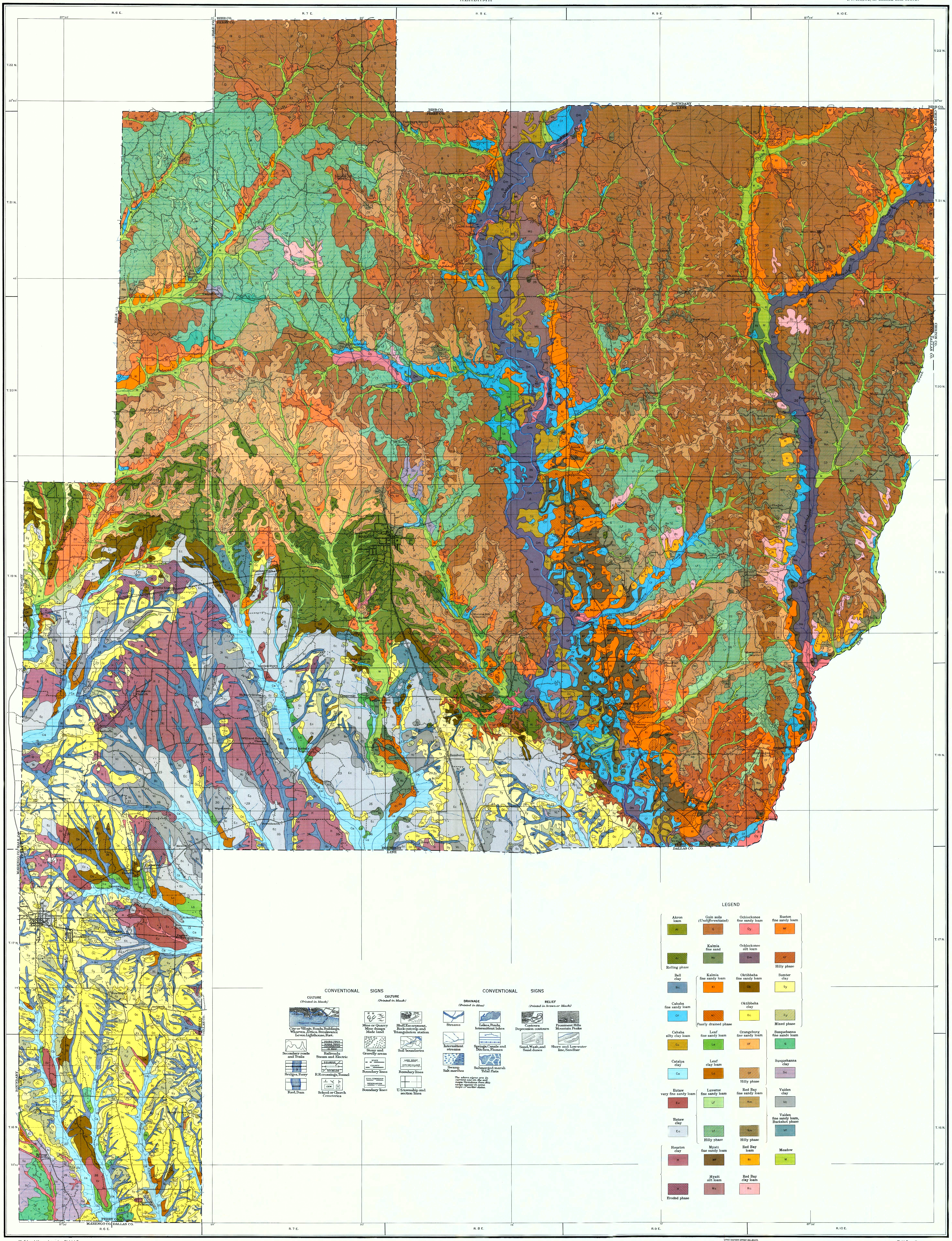
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
HENRY G. KNIGHT, CHIEF
A. G. McCALL, CHIEF, SOIL INVESTIGATIONS
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
PERRY COUNTY
ALABAMA

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
SETH P. STORRS, COMMISSIONER
J. F. STROUD, IN CHARGE SOIL SURVEY



W. Edward Hearn, Inspector, District 2.
Soils surveyed by J. F. Stroud, in charge, M. E. Stephens, and M. E. Swann, Alabama Department of Agriculture and Industries, and G. A. Swenson, W. E. Tharp, and B. H. Williams, U. S. Department of Agriculture.

Scale 1 inch-1 mile

Field Operations
Bureau of Chemistry and Soils
1930